Chapter 9
Water Resources

9.1 Introduction

This chapter describes the impacts on water resources that would result from the construction and operation of each of the build alternatives. The sections that follow describe the study area, the methods used to analyze the impacts, the affected environment, and the impacts of the build alternatives on each of the following water resources.

- Section 9.2, *Surface Water*
- Section 9.3, *Groundwater*
- Section 9.4, *Floodplains*
- Section 9.5, *Wetlands*

The regulations and guidance related to water resources are summarized in Section 9.6, *Applicable Regulations*. Appendix M, *Wetland Resources and Assessments*, provides further data on wetland assessment methods and metrics. The contribution of the proposed rail line to cumulative impacts on water resources is discussed in Chapter 18, *Cumulative Impacts*.

9.2 Surface Water

This section describes the impacts on surface water that could result from construction and operation of each of the build alternatives. Surface water includes streams, rivers, wetlands, irrigation canals or ditches, seeps, and stock ponds. The subsections that follow describe the surface water study area, the methods used to analyze the impacts, the affected environment, and the impacts of the build alternatives on surface water. The regulations and guidance related to surface water are summarized in Section 9.6, *Applicable Regulations*. The contribution of the proposed rail line to cumulative impacts on surface water is discussed in Chapter 18, *Cumulative Impacts*.

In summary, all build alternatives would cross surface waters, including a few that are impaired and do not meet state or federal water quality standards. The majority of the surface waters crossed would be intermittent streams that flow only for short periods during the year. The Moon Creek East Alternative would cross the most surface waters (204) and would require 147 *culverts*,[1] 5 bridges, and 52 drainage structures. The Colstrip Alternative would cross the fewest surface waters (89) and would require 54 culverts, 4 bridges, and 31 drainage structures. These include both rail line crossings and road relocations that would require surface water crossings. All bridges would be free-span (i.e., would not require any structures or supports placed in the channel) except for the Decker Alternatives' bridge crossing of the Tongue River, which could require a support structure in the Tongue River. OEA concludes that these impacts would be adverse.

9.2.1 Study Area

OEA defined the study area for surface water as two areas. The first area is broad and consists of the primary watersheds that would be crossed by the build alternatives; this area provides the general *hydrologic* context for the proposed project. The second area is subsumed by the first area and is based on fieldwork conducted for the build alternatives; this area is the focus of the surface water impact analysis. The second area is defined as the right-of-way for each build alternative (Chapter 2, Section 2.2.1, *Right-of-Way*) and an additional 400 feet of buffer on either side of the right-of-way. The purpose of the buffer is to account for potential impacts on surface waters that are outside of the right-of-way. This second area is 34,858 acres and is the same as the wetlands study area because the field data collected to determine the presence and extent of all surface waters (including wetlands) were collected concurrently (Section 9.5, *Wetlands*, provides a full description of how data were collected and the results for the study area). In addition, the second area also includes the few areas where the proposed road relocations extend outside of the study area.

[1] Terms italicized at first use are defined in Chapter 25, *Glossary*.

9.2.2 Analysis Methods

OEA used the following methods and information to evaluate the impacts of construction and operation of the build alternatives on surface water.

- **Hydrologic review.** TRRC conducted a review of topographic maps, aerial photos, surface water data collected in the study area by OEA, drainage areas, and peak flows (maximum instantaneous discharge of a stream) to determine placement of surface water crossings. TRRC used three methods to calculate peak flows: the Rational Method, Nassick Regression Equations, and U.S. Geologic Survey (USGS) Regression Equations.[2] TRRC approximated flow conditions associated with culverts using the HY-8 software.[3]
- **Surface water crossings and conveyance structures.** TRRC provided OEA with a list of surface water structures (culverts and bridges) that would be placed along each build alternative to convey surface waters under the proposed rail line. The structure locations, types, and sizes were based on TRRC's hydrologic review.

  The primary factors for determining impacts on surface water are the number of surface water crossings and conveyance structures. The installation and presence of these structures would cause the most direct impacts on water quality and hydrology during construction and operation of the proposed rail line. More culverts and bridges at surface water crossings would require more in-channel and in-water work, which could result in more impacts on surface water. Bridges generally would result in fewer surface water impacts than culverts because bridges are better able to maintain stream structure and flow characteristics, maintain transport of *bedload*, and provide less restriction to streamflow. Bridges generally require less instream maintenance than do culverts.
- **Bridge and culvert design.** All bridges would be free-span (i.e., they would span the entire channel with no structures placed in the channel), with the exception of the Decker Alternatives' bridge over the Tongue River (detailed engineering would be required to determine this). The minimum culvert size used at any location would be 36 inches. TRRC anticipated that culverts 72 inches in diameter or less would be made of corrugated metal pipes and culverts larger than 72 inches in diameter would be made of structural plate pipes. Culverts and bridges would be designed to meet BNSF Railway Company (BNSF) hydraulic design criteria and American Railway Engineering and Maintenance-of-Way Association (AREMA) structure design criteria; these structure design criteria would also account for soil pH conditions and culvert coatings that may be required to avoid corrosion. BNSF requires the following hydraulic criteria for culvert design.
  - The 50-year water surface elevation will not meet the inside top of the culvert.

[2] A regression equation is a statistical measure that attempts to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables).

[3] Culvert hydraulic analysis program.

  - The 100-year flood elevation will not overtop the track subgrade elevation at the lowest point of the cross section.

  In regulated floodplain areas, these design criteria would be superseded by state and federal floodplain development requirements. For surface water crossings where TRRC has not yet made a preliminary determination on *conveyance structure* type or size (when "drainage structure" is the designated type of crossing), the conveyance structure would most likely consist of either a culvert at the surface water crossing or the surface water would be diverted along the railbed to the next-closest surface water crossing with a conveyance structure. Final conveyance structure locations, types, and sizes would be determined during final design and permitting. In addition, culverts would be installed along the build alternatives in areas where there are no surface waters to convey rain-induced overland flows across the railbed.

- **Soil erosion.** A secondary factor for assessing impacts on surface water is the presence of easily erodible soils that could affect water quality during construction and operation (Chapter 13, *Geology, Soils, and Paleontological Resources*) provides information on soil erosion and slope characteristics for soils crossed by each build alternative). These impacts would be temporary and could be reduced through best management practices (BMPs). Erosion impacts would not be the primary determining factors when comparing impacts on surface water among the build alternatives.
- **Qualitative review of impacts.** OEA used the results of the hydrologic review to analyze impacts on surface water from the proposed rail line qualitatively. In addition to the data provided by TRRC, OEA analyzed the surface water data it collected in the study area and reviewed surface water using global information system (GIS) technology. OEA reviewed existing U.S. Environmental Protection Agency (USEPA) and Montana Department of Environmental Quality (Montana DEQ) water quality information. OEA also considered the benefits of voluntary and recommended mitigation. OEA's surface water impact analysis focused on water quality, hydrology, and water use, based on construction activities and conveyance structures proposed at each surface water crossing.

9.2.3 Affected Environment

Surface waters in the study area include streams, rivers, wetlands, irrigation canals/ditches, seeps, and stock ponds. The area within which an interconnected system of moving surface waters is confined is called a *watershed*. Watersheds are defined by the drainage divides and can be discussed on small, local, or large scales.

9.2.3.1 Watershed Hydrologic Environment

The build alternatives are located almost entirely within the Tongue River watershed and Rosebud Creek watershed (Figure 9.2-1). A very small portion (1,430 linear feet) of the Tongue River Alternatives and Tongue River Road Alternatives would be in the Yellowstone River-Reservation Creek subwatershed of the Yellowstone River watershed, where these build alternatives would terminate at the BNSF main line in Miles City. The Colstrip Alternatives would be in both the Tongue River watershed and Rosebud Creek watershed. The Moon Creek Alternatives would be mostly in the Tongue River watershed, with approximately 16 percent (13.5 miles) in the Lower Moon Creek subwatershed of the Yellowstone River watershed. A very small portion (1,450 linear feet) of the Moon Creek Alternatives would also be in the Yellowstone River-Reservation Creek subwatershed where they would terminate at the BNSF rail line. The Decker Alternatives would be entirely in the Tongue River watershed.

Tongue River Watershed

The following description of the Tongue River watershed is based on previously published documents (U.S. Environmental Protection Agency and Montana Department of Environmental Quality 2003; U.S. Environmental Protection Agency 2007a).

The Tongue River watershed traverses the states of Wyoming and Montana, encompassing an area of approximately 5,400 square miles. The headwaters of the Tongue River originate in north-central Wyoming in the Bighorn Mountains. From there, the river flows 286 miles to the northeast into southeastern Montana toward its confluence with the Yellowstone River. Major tributaries to the Tongue River include Goose Creek, Prairie Dog Creek, Hanging Woman Creek, Otter Creek, and Pumpkin Creek. The watershed includes portions of Johnson and Sheridan Counties in Wyoming and Big Horn, Rosebud, Powder River, and Custer Counties in Montana. Seventy percent of the watershed lies in Montana, and roughly 30 percent is in Wyoming. The Tongue River also forms the eastern boundary of the Northern Cheyenne Indian Reservation in Rosebud County.

The Tongue River is primarily a single-thread meandering channel migrating through *alluvial deposits* (sediments deposited by flowing water) with no significant valley confinement. Historically, the Tongue River has migrated and presently does migrate across its broad valley because of channel erosion, *avulsion* (rapid displacement of a river channel), and *aggradation* (deposition that results in the rise of the channel bed elevation). The Tongue River has a meandering channel pattern with high *sinuosity* and many *oxbows* (a U-shaped water body formed from a meandering river), suggesting that the Tongue River has been actively migrating and creating meanders for a relatively long time.

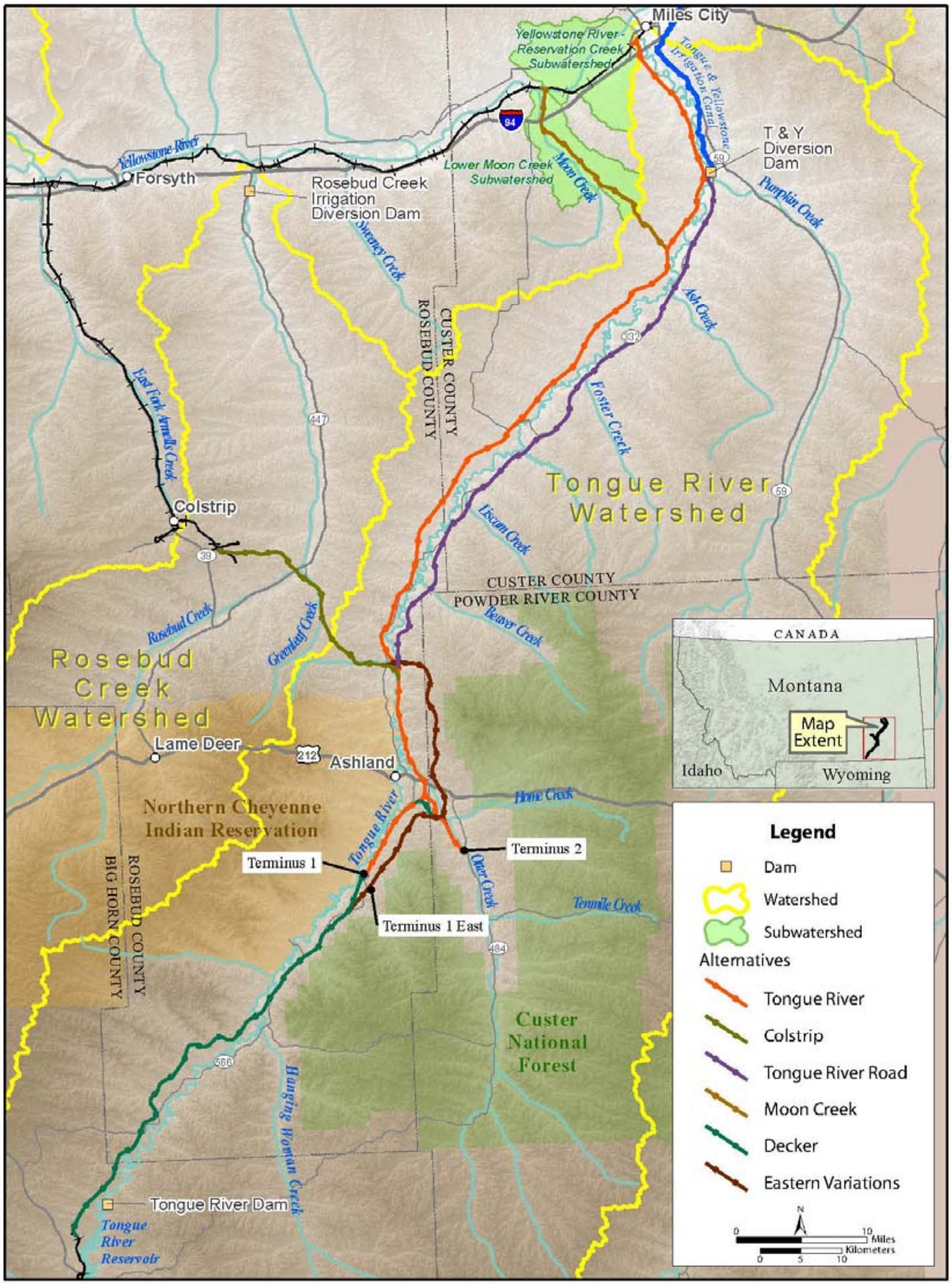


Figure 9.2-1. Watersheds of the Surface Waters Study Area

Flow in the Tongue River varies throughout the year. Based on USGS stream gage flow data, streamflow increases in February and March at the downstream portion of the river. This increase is attributable to snowmelt at lower elevations. Flow then increases along the entire river in April and May because of snowmelt and precipitation at higher elevations. By the end of July, flow in the Tongue River has returned to *baseflow* (low water flow), which is sustained by yearlong snowmelt and rainfall from the Bighorn Mountains. There is little daily variability in flow because of the continuous flow from the mountain regions. Average annual discharge of the Tongue River at Miles City between 1930 and 2013 was 405 cubic feet per second (cfs) (U.S. Geological Survey 2014).

There are two direct diversions located on the Tongue River that affect the river's flow: the Tongue River Dam and Reservoir (TRDR) and the Tongue River Diversion Dam (also known as the T & Y Diversion Dam or the Twelve Mile Dam) (Figure 9.2-1). The TRDR was constructed between 1937 and 1940 and provides water for irrigation, recreational opportunities, and flood protection. The dam is owned by the Montana Department of Natural Resources and Conservation (DNRC). The reservoir typically fills during the winter and spring and water is released, generally during the summer months, to support downstream irrigation. Upstream snowmelt generally causes the dam to overflow in May and June. Water is released later in the summer and fall to provide late-season irrigation flows. Flows taper off through late summer and fall as the volume of water in the reservoir depletes and irrigation demand goes down. The Montana Department of Fish, Wildlife & Parks (Montana FWP) has requested that DNRC maintain downstream flows below the dam at a minimum of 75 cfs at all times to provide suitable habitat for downstream fish. Average annual discharge of the Tongue River at the TRDR between 1940 and 2013 was 431 cfs (U.S. Geological Survey 2014).

The Tongue River Diversion Dam also affects flow in the Tongue River. The dam is located approximately 12 miles upstream of Miles City where it diverts an average of 150 cfs of water into the Tongue and Yellowstone Irrigation Canal to provide water for downstream irrigators between April and October (Figure 9.2-1). Because of this diversion, flows at Miles City are often lower than flows upstream of the dam, particularly from July through September. The Tongue and Yellowstone Irrigation Canal eventually discharges to the Yellowstone River approximately 12.5 miles downstream of the confluence of the Tongue River.

Most of the tributary streams to the Tongue River are small (subwatershed area of less than 50 square miles) and have intermittent flows. Intermittent streams have flow only for short periods during the course of a year, and flow events are usually initiated by rainfall. Three larger tributaries below the TRDR—Hanging Woman Creek, Otter Creek, and Pumpkin Creek— are perennial streams (flow year round), which at times account for more than 90 percent of the flow in the Tongue River at Miles City. These three tributaries have low flows (median flows of 0.7, 1.8, and 0.07 cfs, respectively) for much of the year. Early spring (February to April) snowmelt and rainfall produce the highest sustained tributary flows. Flows then decrease throughout the summer as water evaporates, infiltrates, and is used for irrigation. The streams are dynamic in that flows rapidly increase and decrease in response to storm events and snowmelt. Flows in almost all of the smaller tributaries, as well as the Tongue River, are affected by stock ponds (damming of small streams), irrigation withdrawals, and surface water discharges (e.g., coal bed methane wastewater and irrigation).

Rosebud Creek Watershed

The following description of the Rosebud Creek watershed is from a previously published document (U.S. Environmental Protection Agency and Montana Department of Environmental Quality 2003).

The Rosebud Creek watershed encompasses approximately 1,304 square miles and is located entirely in the state of Montana. The headwaters originate in south-central Montana and flow to the northeast to the confluence with the Yellowstone River. Major tributaries include Greenleaf Creek, Lame Deer Creek, Muddy Creek, Cottonwood Creek, and West Rosebud Creek; only Greenleaf Creek would be near the proposed rail line. Rosebud Creek has a total length of about 208 miles and flows through Big Horn County and Rosebud County. It follows a winding course through a relatively narrow valley bounded by gently rolling hills or flatlands. Rosebud Creek is a major tributary to the Yellowstone River and accounts for 2 percent of the total Yellowstone River drainage area.

Flow in Rosebud Creek varies throughout the year. Based on USGS stream gage flow data, flow increases in February and March because of snowmelt at lower elevations. Flows then decrease in April and increase again in May because of snowmelt at higher elevations and precipitation. By the end of July, evaporation, reduced precipitation, and withdrawals cause Rosebud Creek to flow at baseflow. Flow slightly increases from upstream to downstream, with the most pronounced changes in flow during the rainfall and snowmelt season. The high variability in daily flow results from flows sustained by intense rainstorms and snowmelt. Average annual discharge volume of Rosebud Creek near Colstrip between 1975 and 2006 was 22 cfs; at the mouth, between 1975 and 2005, average annual discharge volume of Rosebud Creek was 26 cfs (U.S. Geological Survey 2014). A diversion dam in Rosebud Creek at river mile 3.8 is used for irrigation purposes.

Most of the streams in the Rosebud Creek watershed are classified as intermittent streams. Perennial streamflow is classified only in the Rosebud Creek headwaters of the watershed, including Rosebud Creek and most of its tributaries in the Rosebud Creek headwater region. Mountain streams of varying sizes have perennial flow because of snowmelt and precipitation, while streams at lower elevations are generally intermittent and flow after local rainstorms. Most of the canals, ditches, and connectors are located in the headwaters of Rosebud Creek and Muddy Creek as well as near the mouth of Rosebud Creek. This is most likely to take advantage of snowmelt runoff and high flows for irrigated crop production.

Lower Moon Creek Subwatershed

The Lower Moon Creek subwatershed is 24,926 acres and drains to the south side of the Yellowstone River via Moon Creek. There is no available flow data for any streams in the subwatershed, but streamflow is most likely similar to the Tongue River and Rosebud Creek watersheds where flow increases in February and March because of snowmelt at lower elevations. By the end of July, evaporation, reduced precipitation, and withdrawals cause streams to dry up. Based on the USGS (2011) National Hydrography Dataset, there are no perennial streams in the subwatershed, including Moon Creek. Many intermittent streams drain into Moon Creek, including the main tributaries East Fork Moon Creek and West Fork Moon Creek. In addition, many stock ponds have been created throughout the subwatershed by damming streams.

Yellowstone River-Reservation Creek Subwatershed

The Yellowstone River-Reservation Creek subwatershed is 34,612 acres and spans from the north side of the Yellowstone River to the south side. With the exception of the Yellowstone River, there are no available flow data for any streams in the subwatershed. However, because the subwatershed is adjacent to the Tongue River watershed, streamflow in the subwatershed is likely similar to the Tongue River watershed where flow increases in February and March because of snowmelt at lower elevations. By the end of July, evaporation, reduced precipitation, and withdrawals cause streams to dry up (with exception of the Yellowstone River).

Average annual discharge of the Yellowstone River at Miles City between 1922 and 2013 was 11,228 cfs (U.S. Geological Survey 2014). Based on the USGS (2011) National Hydrography Dataset, the only perennial stream in the subwatershed is the Yellowstone River. Tributaries to the Yellowstone River from the north and south are intermittent streams and include Coal Creek, Reservation Creek, and Cotton Creek. Many of the intermittent streams on the south side of the Yellowstone River along agricultural areas are intercepted by canals and ditches that are most likely used for irrigation. In addition, many stock ponds have been created throughout the subwatershed by damming streams.

9.2.3.2 Watershed Surface Water Quality Conditions

Under Section 303(d) of the Clean Water Act (CWA), states, territories, and authorized tribes are required to develop lists of impaired surface waters. Impaired surface waters listed under Section 303(d) are those that do not meet water quality standards that states, territories, and authorized tribes have established. The CWA requires that these jurisdictions establish priority rankings for surface waters on the list and develop total maximum daily loads (TMDLs) of pollutants for these surface waters. A TMDL is a calculation of the maximum amount of a pollutant that a surface water body can receive and still safely meet water quality standards. In Montana, Montana DEQ has been delegated authority by USEPA to assess water quality of Montana surface waters and develop the state's Section 303(d) list of impaired surface waters. Surface waters are assigned priority rankings of 1 through 5, with Category 5 surface waters considered impaired under Section 303(d). Category 5 is defined as surface waters where one or more applicable beneficial uses are impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat. Every 2 years, Montana DEQ reviews and assesses the water quality of surface waters statewide and issues a new Section 303(d) list of impaired surface waters. The 2014 Montana Section 303(d) list of impaired surface waters was published in May 2014 (Montana Department of Environmental Quality 2014).

The Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation established water quality standards for tribal surface waters in 2013 (Northern Cheyenne Tribe 2013) to "protect public health and welfare, enhance the quality of water, and serve the purposes of the Federal Clean Water Act." The Northern Cheyenne Tribe has not established an official Section 303(d) list of impaired surface waters on the reservation. However, the tribe has developed a classification system that defines the designated uses and values of surface waters on the reservation. The tribe has also established an antidegradation policy that addresses actions to maintain existing uses and water quality of the surface waters on the reservation.

Tongue River Watershed

Five surface waters in the Tongue River watershed from the TRDR to the mouth (Yellowstone River) are Section 303(d) listed as impaired Category 5 surface waters: the Tongue River Reservoir, Tongue River, Hanging Woman Creek, Otter Creek, and Pumpkin Creek. Table 9.2-1 summarizes the cause and probable sources of the impairment and the associated water use that is affected by the impairment. TMDLs have not been completed for any of these impairments. USEPA also assessed water quality in the Tongue River watershed (U.S. Environmental Protection Agency 2007a). The assessment was conducted for informational purposes, and the results were not provided as conclusions regarding water impairment status under Section 303(d). However, the results of the assessment generally agree with the Section 303(d) Category 5 list of impaired surface waters in the Tongue River watershed. In addition, the nine causes of impairment for the Tongue River below the Tongue River Diversion Dam to the mouth were all first listed in 2008; these listings were most likely informed by the USEPA assessment.

Table 9.2-1. Section 303(d) Category 5 List of Impaired Surface Waters in the Tongue River Watershed below the Tongue River Dam and Reservoir

Surface Water	Cause of Impairment	Probable Source of Impairment	Associated Water Use Affected
Tongue River Reservoir	Dissolved oxygen	Municipal point-source discharges, irrigated crop production	Aquatic life
	Solids (suspended/ bedload)	Municipal point-source discharges, irrigated crop production	Aquatic life
Tongue River[a]	Iron	Natural sources, irrigated crop production, streambank modification/stabilization	Aquatic life
	Solids (suspended/ bedload)	Natural sources, irrigated crop production, streambank modification/stabilization	Aquatic life
Tongue River[b]	Cadmium	Impacts from hydrostructure flow regulation/modification, natural sources, irrigated crop production, streambank modification/ destabilization	Aquatic life
	Copper	Impacts from hydrostructure flow regulation/modification, natural sources, irrigated crop production, streambank modification/ destabilization	Aquatic life
	Iron	Impacts from hydrostructure flow regulation/modification, natural sources, irrigated crop production, streambank modification/ destabilization	Aquatic life
	Lead	Impacts from hydrostructure flow regulation/modification, natural sources, irrigated crop production, streambank modification/ destabilization	Drinking water, aquatic life
	Nickel	Impacts from hydrostructure flow regulation/modification, natural sources, irrigated crop production, streambank modification/ destabilization	Drinking water, aquatic life
	Salinity	Impacts from hydrostructure flow regulation/modification, natural sources, irrigated crop production, streambank modification/ destabilization	Agriculture
	Solids (suspended/ bedload)	Impacts from hydrostructure flow regulation/modification, natural sources, irrigated crop production, streambank modification/ destabilization	Drinking water, aquatic life
	Sulfates	Impacts from hydrostructure flow regulation/modification, natural sources, irrigated crop production, streambank modification/ destabilization	Agriculture

Surface Water	Cause of Impairment	Probable Source of Impairment	Associated Water Use Affected
	Zinc	Impacts from hydrostructure flow regulation/modification, natural sources, irrigated crop production, streambank modification/ destabilization	Aquatic life
Hanging Woman Creek[c]	Iron	Natural sources	Aquatic life
	Salinity	Natural sources	Agriculture
	Sedimentation/ siltation	Irrigated crop production, grazing in riparian or shoreline zones, streambank modifications/ destabilization, rangeland grazing, natural sources	Aquatic life
Hanging Woman Creek[d]	Salinity	Natural sources	Agriculture
Otter Creek	Iron	Natural sources, agriculture, grazing in riparian or shoreline zones	Aquatic life
	Salinity	Natural sources	Agriculture
Pumpkin Creek[e]	Salinity	Natural Sources	Agriculture
	Water temperature	Irrigated crop production, natural sources	Aquatic life

Notes:
[a] Hanging Woman Creek to Beaver Creek segment and Beaver Creek to Tongue River Diversion Dam segment
[b] Tongue River Diversion Dam to mouth (Yellowstone River)
[c] Stroud Creek to mouth (Tongue River)
[d] Wyoming border to Stroud Creek
[e] From Little Pumpkin Creek to Pumpkin Creek mouth (Tongue River) and Pumpkin Creek headwaters to Little Pumpkin Creek
Source: Montana Department of Environmental Quality 2014

Rosebud Creek Watershed

Rosebud Creek is the only Section 303(d) Category 5 listed impaired surface water in the Rosebud Creek watershed. Rosebud Creek is listed as impaired by “other” from the Northern Cheyenne Reservation’s northern boundary downstream to a dam that is 3.8 miles upstream from the stream’s mouth (Yellowstone River) (Montana Department of Environmental Quality 2014). Montana DEQ has not defined or described “other” in this context. The probable source is listed as dam construction (other than upstream flood control projects), and the affected associated use is aquatic life. No TMDL has been completed for Rosebud Creek’s impairment.

Lower Moon Creek Subwatershed

No Section 303(d) Category 5 impaired surface waters are listed for the Lower Moon Creek subwatershed (Montana Department of Environmental Quality 2014).

Yellowstone River-Reservation Creek Subwatershed

The Yellowstone River segment in the Yellowstone River-Reservation Creek subwatershed portion of the study area is listed as a Section 303(d) Category 5 impaired surface water (Table 9.2-2).

Table 9.2-2. Section 303(d) Category 5 List of Impaired Surface Waters in the Yellowstone River[a]-Reservation Creek Subwatershed

Cause of Impairment	Probable Source of Impairment	Associated Water Use Affected
Copper	Source unknown	Aquatic life
Lead	Source unknown	Aquatic life
Nitrate/nitrite	Streambank modifications/destabilization, source unknown, post-development erosion and sedimentation, irrigated crop production, rangeland grazing, agriculture, natural sources, municipal point-source discharges	Aquatic life
Solids (suspended/bedload)	Rangeland grazing, source unknown, agriculture, streambank modifications/destabilization, irrigated crop production, natural sources	Aquatic life
Total dissolved solids	Source unknown, agriculture, natural sources, irrigated crop production	Aquatic life
Zinc	Source unknown	Aquatic life
pH	Source unknown	Aquatic life

Notes:
[a] Cartersville Diversion Dam to Powder River
Source: Montana Department of Environmental Quality 2014
pH = a measurement of the acidity or basicity of a substance

9.2.3.3 Surface Water Use

USGS reports water-use estimates every 5 years by state and county for the following eight categories of use: public supply, domestic, irrigation, livestock, aquaculture, industrial, mining, and thermoelectric power. Irrigation is the dominant surface water use in the four counties that any of the build alternatives would traverse (Table 9.2-3). Surface water withdrawals for irrigation account for at least 98 percent of all surface water withdrawals in Big Horn, Custer, and Powder River Counties. For Rosebud County, irrigation accounts for 87 percent of all surface water withdrawals, with thermoelectric power accounting for about 11 percent. Most irrigation withdrawals are associated with agriculture croplands where surface flooding irrigation is the primary method; some irrigation is by sprinkler systems. A high concentration of these agricultural croplands occurs along the Tongue River. In 2007, irrigated land accounted for 59,570 acres in the Tongue River watershed out of 222,262 acres identified as cropland (U.S. Department of Agriculture 2009).

Table 9.2-3. Surface Water Use (million gallons per day) by Category in Big Horn, Custer, Powder River, and Rosebud Counties

County	Public Supply	Irrigation	Livestock	Aquaculture	Mining	Thermo-electric	Total
Big Horn	0.84	267.34	0.28	0	2.67	0	271.13
Custer	1.38	117.87	1.1	0.01	0.01	0	120.37
Powder River	0	38.58	0.07	0	0	0	38.65
Rosebud	0.68	210.94	0.82	0	2.03	27.8	242.27

Notes:
Source: U.S. Geological Survey 2009
U.S. Geological Survey surface water use data could only be obtained by county and not by watershed. Therefore, this data includes areas beyond the study area described in Section 9.2.1, *Study Area*.

9.2.4 Environmental Consequences

Impacts on surface waters could result from construction and operation of the build alternatives. The impacts common to all build alternatives are presented first, followed by impacts specific to each build alternative.

Construction and operation of the proposed rail line would result in both physical and chemical alteration of surface waters crossed by or adjacent to the build alternatives. Potential physical alterations include changes in sediment transport and deposition, modification of channel configuration and morphology, changes in streamflow characteristics (e.g., volume, velocity), and surface water withdrawals during construction. Potential chemical alterations are primarily related to water quality. Other sections of this Draft EIS address impacts on other resources that may be associated with surface waters, such as Section 8.3, *Wildlife*; Section 8.4, *Fish*; Section 8.5, *Special-Status Species*; Section 9.4, *Floodplains*; and Section 9.5, *Wetlands*.

Coal dust impacts on surface waters are assessed in Chapter 6, *Coal Dust*. Coal dust that deposits to the ground could make its way into surface waters. OEA found the estimates of coal dust constituent concentrations in surface water to be below screening levels for ecological exposure, with the exception of barium. OEA’s conservative assumptions in the analysis overestimate the amount of barium that might reach the water, and do not consider the likelihood that barium would quickly precipitate out of solution; as a result, OEA expects that barium concentrations in surface water attributable to coal dust deposition would be below screening levels. For additional information on coal dust and barium in surface waters see Chapter 6, *Coal Dust.*

9.2.4.1 Impacts Common to All Build Alternatives

Construction

Construction of the proposed rail line would require vegetation removal, excavation, and fill placement in the rights-of-way and the installation of culverts and bridges where the proposed rail line and road relocations would cross surface waters. TRRC has also stated that water would be withdrawn from the Tongue River, Yellowstone River, or water wells, or a combination thereof, for dust suppression and soil compaction during the construction period. All water used during construction could be entirely surface water withdrawn from the Tongue River or Yellowstone River. Construction activities could contribute to physical alterations of surface water and the degradation of water quality in those water bodies. The extent of such impacts would depend on the specific activity and its proximity to surface water, which would depend on the final design characteristics of that build alternative. The intensity of impacts on surface water would vary depending on the number of surface water crossings, number of new bridges and culverts, presence of easily erodible soils, and amount of water used for dust suppression and soil compaction.

- **Physically Alter Surface Water Flow**

  Clearing, excavation, and fill placement to construct the proposed rail line, access roads, staging areas, and other associated facilities would expose soil and other materials (e.g., subballast, hot-mix asphalt trackbed) to the erosive forces of wind, rain, and surface runoff. This exposure would increase sediment, erosion, and the potential for material to be transported to surface waters during rainstorms or snowmelt. Introduction of increased sediment loads to a stream system could change the sediment deposition and transport characteristics of that system, resulting in potential changes in downstream channel morphology, including a reduction in channel sinuosity, increased channel gradient, and reduced pool depth (U.S. Environmental Protection Agency 2007b).

  The proposed rail line is not expected to cause any significant changes in surface drainage patterns in the watershed because the installation of properly sized culverts and bridges would maintain stream and drainage connectivity and minimize impacts on railroad facilities and adjacent properties during higher than average flow. However, both culvert and bridge installation may require (depending on the time of year, if flow is present) surface water alterations during construction. These could include temporary channel blockage or stream rerouting to isolate in-water worksites, channel straightening to achieve the proper culvert or bridge approach alignment, channel and streambank excavation and fill placement for culvert installation and bridge abutment construction, and placement of engineered stream bank structures for erosion protection. Such activities could alter stream configuration and hydraulics, resulting in higher discharge velocities. These alterations could cause increased streambed erosion and sediment loads, changes in pool, riffle and run structure, and increased transport of nutrients and other pollutants (U.S. Environmental Protection Agency 2007b).

Although the proposed rail line would not result in any significant alterations to drainage patterns, some flow alterations could occur. For surface water crossings where TRRC has not yet made a preliminary determination regarding conveyance structure type or size (when "drainage structure" is the designated type of crossing), surface water could be diverted along the railbed to the next closest surface water crossing with a conveyance structure. If so, the surface water would most likely be a small intermittent stream with little flow this is very close to another stream that would be crossed. Such a diversion could increase the volume of flow carried by certain streams over current conditions and could result in increased streambed and streambank erosion and sedimentation in the receiving surface water. In contrast, the downstream portion of the redirected stream would lose a portion of its hydrologic input.

No bank-engineered structures (e.g., *riprap* or *bank armoring*) would be required along the Tongue River in the channel or below the river's ordinary high-water mark for any of the build alternatives. Riprap would be used to armor bridge abutment foreslopes in some locations, but the riprap would be placed outside of the channel and above the ordinary high-water mark. In addition, all proposed bridge crossings would consist of free-span bridges (i.e., entire stream channel is spanned with no permanent in-water structures), with the exception of the Decker Alternatives' bridge crossing of the Tongue River, which may require a bridge support structure in the channel (Section 9.2.4.2, *Impacts by Build Alternative*).

- **Temporarily Degrade Water Quality**

The erosion and transport of sediment caused by clearing, excavation, and fill placement could degrade water quality. Surface water that would be crossed by the proposed rail line as well as downstream receiving water bodies would be most directly affected. Increased sediment loads could increase turbidity, which could lead to higher stream temperatures because darker sediment particles absorb more heat from solar radiation (U.S. Environmental Protection Agency 2007b). Higher temperatures can decrease dissolved oxygen, increase *volatilization*, and decrease *sorption* to particulate matter. These actions, in turn, alter the *bioavailability* of metals and toxic organics (U.S. Environmental Protection Agency 2007b).

Increased erosion and runoff could allow a variety of chemicals to enter surface waters from eroding soils, including nutrients, metals, toxic compounds, and organic materials, potentially resulting in complex changes to water chemistry and pH (U.S. Environmental Protection Agency 2007b). Potential sources for these contaminants would include construction equipment, which could leak petrochemicals and other fluids either directly into surface waters or onto the ground where it could be carried into a nearby waterway by surface runoff. If asphalt subballast is used for track construction, there is the potential for polycyclic aromatic hydrocarbons (PAHs) and petroleum hydrocarbons to enter surface waters through runoff from the application area. PAHs occur naturally throughout the environment in the air, water, and soil but can also be manufactured.

PAHs are found in substances such as asphalt, oil, coal, and creosote (Agency for Toxic Substances and Disease Registry 1995). Most PAHs do not dissolve easily in water; they stick to solid particles and settle to the bottom of surface waters (Agency for Toxic Substances and Disease Registry 1995).

Although degradation of water quality in surface waters would occur during the construction period, this impact would be temporary. BMPs would reduce this impact. Any turbid water bodies caused by construction activities would return to baseline conditions once the fine sediment material settled. OEA does not expect long-term impacts on water quality from construction activities.

- **Temporarily Use Surface Water**

TRRC plans to use water for dust suppression and soil compaction during construction through a contractor-coordinated purchase of temporary water rights access to the Tongue River, the Yellowstone River, water wells, or a combination thereof. According to DNRC (2013) water rights GIS data, there are 334 individual active water rights points for surface water withdrawals in the Tongue River. In addition, there are 87 and 116 individual active water rights points for surface water withdrawals in the Yellowstone River in Custer and Rosebud Counties, respectively.

Laws pertaining to groundwater use are codified in the Montana Code Annotated (MCA). MCA 85-2-101(3) states the following.

> It is the policy of this state and a purpose of this chapter to encourage the wise use of the state's water resources by making them available for appropriation consistent with this chapter and to provide for the wise utilization, development, and conservation of the waters of the state for the maximum benefit of its people with the least possible degradation of the natural aquatic ecosystems.

MCA 85-2-427 contains the requirements for a temporary lease of an appropriation right, which TRRC would need to comply with for their purchase of temporary water rights from an existing water rights holder. To lease an appropriation right, an appropriator (i.e., existing water rights holder) must submit a permit form to the DNRC Water Rights Bureau. The application must include a written narrative addressing the appropriator's plan to prevent potential adverse effects on existing water rights, certificates, permits, and water reservations, including any mitigation to prevent adverse effects. The appropriator's plan must demonstrate that 1) operation of the proposed lease will not exceed historic use, including flow rate, historic diverted volume, and historic consumptive volume, and 2) the proposed lease is capable of being implemented and operated to prevent adverse effect (Administrative Rule of Montana [ARM] 36.12.2101). Once approved by the DNRC Water Rights Bureau, the appropriator can temporarily lease its water right (e.g., to TRRC).

During construction, TRRC could use water from the Tongue River or Yellowstone River for dust suppression and soil compaction. All build alternatives would require water for dust suppression during construction, but in different volumes depending on the length of the alternative (i.e., longer build alternatives would result in more surface disturbance, which would require more water). TRRC estimates that water needed for the build alternatives would range from 912 acre-feet (approximately 297 million gallons) (Colstrip Alternative) to 2,404 acre-feet (approximately 783 million gallons) (Moon Creek East Alternative) during the construction period. However, the volume of water needed for any build alternative would be an insignificantly small percentage of the annual average discharge of the Yellowstone and Tongue Rivers. The annual average discharge for the Tongue River, based on an average of three USGS stream gages along the river, is 371,896 acre-feet per year; for the Yellowstone River at Miles City, the discharge is 8,172,172 acre-feet per year. Assuming the highest potential water use (Moon Creek East Alternative, withdrawing 2,404 acre-feet), with surface water used only for dust suppression and soil compaction, the withdrawal of water for construction would represent 0.65 percent of the annual discharge for the Tongue River and 0.03 percent of annual discharge for Yellowstone River. Further, this water would be withdrawn over multiple years (duration of construction), so the percentages would be even smaller if the volumes were split equally into the number of construction years. In addition, any water withdrawals would be temporary, lasting the duration of construction. Withdrawals would be made under existing state-authorized water rights allocations per MCA 85-2-427 and the associated DNRC Water Rights Bureau approval process and would not reduce the amount of available water beyond what is already authorized by DNRC.

Operation

The severity of the common operation impacts would vary, depending on the volume of train traffic and required maintenance. Operation of the proposed rail line could result in both physical and chemical alteration of surface waters through the continued presence of culverts and bridges, train operation, and maintenance of the rail line and associated facilities. Train traffic on the proposed rail line would average 7.4 trains per day but could be as high as 26.7 trains per day under the high coal production scenario.[4] The number of trains per day would not change the types of operation impacts described below, but it could affect the extent of the impact (e.g., more trains could result in increased maintenance activities or increased incidental discharge of pollutants).

- ### Physically Alter Surface Water Flow

  Culverts and bridges would continue to alter channel hydraulics because both types of structures would confine the flow, causing increased flow velocity (U.S. Environmental Protection Agency 2007b). This could result in increased channel scour and erosion processes (*lateral migration* and *bank undercutting*), which could lead to increased

[4] The coal production scenarios (low, medium, high) reflect different levels of rail traffic, depending on which build alternative is licensed, which mines are induced or developed, and the production capacities of those mines. The coal traffic scenarios are described in Appendix C, *Coal Production and Markets.* The related rail traffic is summarized in Chapter 2, Section 2.3.3, *Rail Traffic*.

sediment loads and downstream sedimentation. Impacts caused by increased flow velocity from culverts and bridges would most likely continue until *dynamic equilibrium* in the stream channel is reestablished with these structures in place. Dynamic equilibrium refers to the ability of the stream to persist within a range of conditions. Maintaining this balance requires a series of self-correcting mechanisms. A disturbance to a stream system (e.g., the installation of a culvert) triggers these self-correcting mechanisms to maintain the dynamic equilibrium (Washington State Department of Ecology Undated). For example, changes in streambed load and bed material size are balanced by changes in streamflow or channel gradient.

- **Degrade Water Quality**

  Operation and maintenance activities could result in water quality impacts on surface waters. Stormwater runoff from the railbed and access road surface may transport fine-grained sediments and other pollutants from trains and maintenance vehicles into surface waters where they could alter water chemistry, as described previously. Fugitive dust generated by rail operation and maintenance vehicles that use gravel access roads could also affect water quality by depositing fine sediments into surface waters. Such impacts would typically be limited to those portions of the rail line that are near surface waters.

  Operation also has the potential to deposit pollutants as rainwater drains from the railbed and right-of-way into surface waters (Osborne and Montague 2005). The two most important types of pollutants connected with railway transport are PAHs and heavy metals (Wilkomirski et al. 2011). As stated previously, PAHs occur naturally throughout the environment in the air, water, and soil but can also be manufactured. PAHs are found in substances such as asphalt, oil, coal, and creosote (Agency for Toxic Substances and Disease Registry 1995). The main source of PAHs in areas around rail lines is from substances used for rail car use such as machine grease, fuel oils, and transformer oils (Wilkomirski et al. 2011). Heavy metals in emissions and rail car material abrasion (e.g., rubbing of metal wheel against metal track) can accrue on plants and in soil (Wilkomirski et al. 2011). Stormwater discharges from the railbed and access roads could convey low concentrations of these pollutants to surface waters. Most PAHs do not dissolve easily in water; they stick to solid particles and settle at the bottom of surface waters (Agency for Toxic Substances and Disease Registry 1995). Any releases of PAHs and heavy metals associated with operating the proposed rail line could degrade surface water quality in the immediate vicinity of the rail line.

9.2.4.2 Impacts by Build Alternative

The impacts on surface waters that are specific to each build alternative are described below and supported by the following tables and figures.

- Table 9.2-4 shows the summary of proposed rail line surface water crossing structures by build alternative.

- Table 9.2-5 shows the summary of road relocation surface water crossing structures by build alternative.
- Figure 9.2-2 shows the Section 303(d) Category 5 impaired surface waters.

Table 9.2-4. Number of Rail Line Surface Water Crossing Structures by Build Alternative

Build Alternative	Structure Type				Total
	CMP	SPP	Bridge	Drainage Structure[a]	
Tongue River	88	39	2	16	145
Tongue River East	94	53	2	18	167
Colstrip	24	30	4	4	62
Colstrip East	29	44	3	6	82
Tongue River Road	33	78	7	51	169
Tongue River Road East	39	91	7	52	189
Moon Creek	84	43	4	26	157
Moon Creek East	90	57	4	28	179
Decker	60	40	1	12	113
Decker East	56	44	1	12	113

Notes:
[a] Drainage structures would be for surface water crossings where TRRC has not yet made a preliminary determination regarding conveyance structure type or size. The conveyance structure would most likely consist of either a culvert at the surface water crossing, or the surface water would be diverted along the railbed for a distance to the next-closest surface water crossing with a conveyance structure.
CMP = corrugated metal pipe; SPP = structural plate pipe

Table 9.2-5. Number of Road Relocation Surface Water Crossing Structure Types by Build Alternative

Build Alternative	Structure Type		Total
	Bridge	Drainage Structure[a]	
Tongue River	0	25	25
Tongue River East	1	18	19
Colstrip	0	27	27
Colstrip East	1	20	21
Tongue River Road	0	17	17
Tongue River Road East	1	10	11
Moon Creek	0	31	31
Moon Creek East	1	24	25
Decker	0	16	16
Decker East	0	15	15

Notes:
[a] Drainage structures would be for surface water crossings where TRRC has not yet made a preliminary determination regarding conveyance structure type or size. The conveyance structure would most likely consist of either a culvert at the surface water crossing, or the surface water would be diverted along the railbed for a distance to the next-closest surface water crossing with a conveyance structure.

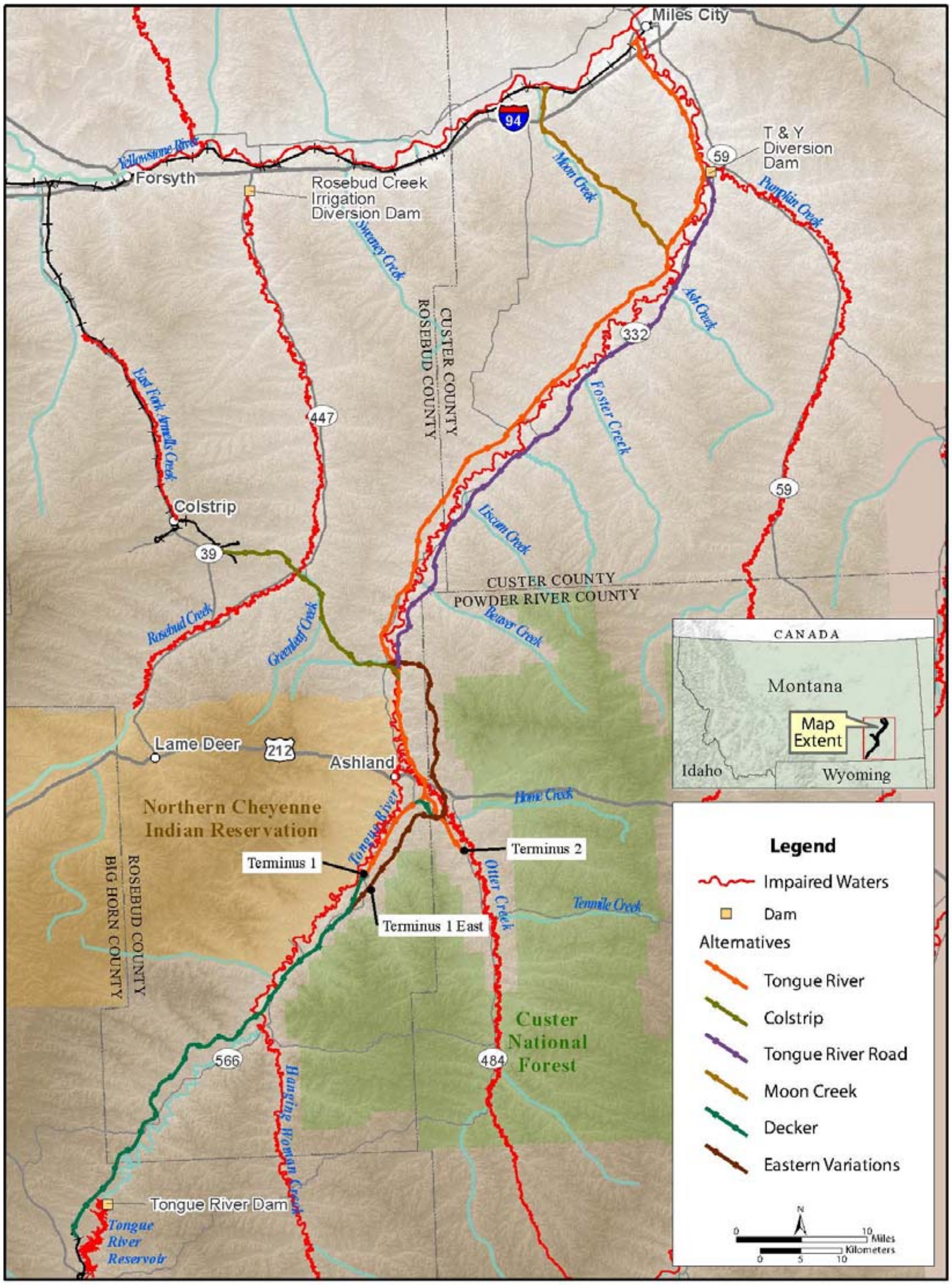


Figure 9.2-2. 303(d) Impaired Waters

Tongue River Alternatives

Tongue River Alternative

Construction and operation of the Tongue River Alternative would result in the specific impacts listed below.

The Tongue River Alternative would require 145 surface water crossings for the proposed rail line and 25 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 114 streams, 14 streams with associated wetlands, and 17 wetlands not associated with a stream. Proposed rail line crossings would require 127 culverts, 2 bridges, and 16 drainage structures. Road relocations would cross 22 streams, 2 streams with associated wetlands, and 1 wetland not associated with a stream. Road relocation crossings would require 25 drainage structures (Table 9.2-5).

The Tongue River Alternative would cross the Tongue River and Otter Creek, both of which are Section 303(d) Category 5 listed impaired surface waters (Figure 9.2-2). Iron and solids (suspended/bedload) currently impair the Tongue River where this build alternative would cross the river, and iron and salinity currently impair Otter Creek where this build alternative would cross the river. Probable sources of these impairments are listed in Table 9.2-1.

The Tongue River is naturally high in sediment, and metals (including iron) are bound to sediments in varying degrees; data have shown that an increase in sediment in the river will result in an increase in metals (including iron) (U.S. Environmental Protection Agency 2007a). Minimizing sediment input into the river would reduce iron input into the river. The soil type mapped by the Natural Resources Conservation Service at the crossing for this build alternative is the Yamac-Havre Association, which has a low erodibility factor and slope, indicating a low potential for erosion by water (Chapter 13, *Geology, Soils, and Paleontological Resources*, provides information on soil erosion and slope characteristics for soils crossed by each build alternative). Soil disturbance during bridge construction could mobilize sediment into the Tongue River, which would increase suspended sediment and iron into the river. However, the presence of soils with low water erosion potential and implementation of BMPs would reduce this potential impact. Any surface water impacts during construction would be temporary and would last only for the duration of construction.

The impact on Otter Creek's iron impairment would be similar to what is described above for the Tongue River because the same soil type is mapped at the bridge crossing of Otter Creek. Otter Creek has naturally high salinity, and any disturbance of soils around Otter Creek could affect salinity levels if the soils are sodic (high concentrations of sodium) and have a high sodium absorption ratio (SAR) (Chapter 13, Section 13.4.3, *Soils*). However, the soil mapped around the Otter Creek crossing (Yamac-Harve) has an SAR of zero (0), meaning there are no sodic conditions.

Tongue River East Alternative

The Tongue River East Alternative would require 167 surface water crossings for the proposed rail line and 19 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 137 streams, 14 streams with associated wetlands, and 16 wetlands not associated with a stream. Proposed rail line crossings would require 147 culverts, 2 bridges, and 18 drainage structures. Road relocations would cross 15 streams, 3 streams with associated wetlands, and 1 wetland not associated with a stream. Road relocation crossings would require 18 drainage structures and 1 bridge in Otter Creek (Table 9.2-5).

Construction and operation of the Tongue River East Alternative would result in the same impacts on Section 303(d) Category 5 listed impaired surface waters as those described above for the Tongue River Alternative.

Colstrip Alternatives

Colstrip Alternative

The Colstrip Alternative would require 62 surface water crossings for the proposed rail line and 27 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 55 streams, 4 streams with associated wetlands, and 3 wetlands not associated with a stream. Proposed rail line crossings would require 54 culverts, 4 bridges, and 4 drainage structures. Road relocations would cross 23 streams and 4 streams with associated wetlands. Road relocation crossings would require 27 drainage structures (Table 9.2-5).

The Colstrip Alternative would cross three Section 303(d) Category 5 listed impaired surface waters: the Tongue River, Otter Creek, and Rosebud Creek (Figure 9.2-2). This build alternative would result in the same impacts on Section 303(d) Category 5 listed impaired surface waters as described above for the Tongue River Alternative, except as noted below.

Rosebud Creek is impaired by “other” at the alternative crossing. Montana DEQ has not defined or described “other” in this context. The probable source is listed as dam construction (other than upstream flood control projects), and the associated water use affected is aquatic life. Any surface water quality impacts during construction would be temporary and would last only for the duration of construction.

Colstrip East Alternative

The Colstrip East Alternative would require 82 surface water crossings for the proposed rail line and 21 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 77 streams, 4 streams with associated wetlands, and 1 wetland not associated with a stream. Proposed rail line crossings would require 73 culverts, 3 bridges, and 6 drainage structures. Road relocations would cross 16 streams and 5 streams with associated wetlands. Road relocation crossings would require 20 drainage structures and 1 bridge in Otter Creek (Table 9.2-5).

The Colstrip East Alternative would cross the Tongue River approximately 4,000 feet downstream of the Colstrip Alternative crossing. Impacts on Section 303(d) Category 5 listed impaired surface waters would be the same as those described above for the Colstrip Alternative.

Tongue River Road Alternatives

Tongue River Road Alternative

The Tongue River Road Alternative would require 169 surface water crossings for the proposed rail line and 17 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 133 streams, 19 streams with associated wetlands and 17 wetlands not associated with a stream. Proposed rail line crossings would require 111 culverts, 7 bridges, and 51 drainage structures. Road relocations would cross 17 streams. Road relocation crossings would require 17 drainage structures (Table 9.2-5).

The Tongue River Road Alternative would cross two Section 303(d) Category 5 listed impaired surface waters, the Tongue River and Otter Creek. The Tongue River crossing would be 0.86 mile upstream of the Tongue River Diversion Dam. Impacts on Section 303(d) Category 5 listed impaired surface waters would be the same as those described above for the Tongue River Alternative.

Tongue River Road East Alternative

The Tongue River Road East Alternative would require 189 surface water crossings for the proposed rail line and 11 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 154 streams, 19 streams with associated wetlands, and 16 wetlands not associated with a stream or drainage. Proposed rail line crossings would require 130 culverts, 7 bridges, and 52 drainage structures. Road relocations would cross 10 streams and 1 stream with associated wetlands. Road relocation crossings would require 10 drainage structures and 1 bridge over Otter Creek (Table 9.2-5).

Construction and operation of the Tongue River East Alternative would result in the same impacts on Section 303(d) Category 5 listed impaired surface waters as those described above for the Tongue River Alternative.

Moon Creek Alternatives

Moon Creek Alternative

The Moon Creek Alternative would require 157 surface water crossings for the proposed rail line and 31 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 134 streams, 11 streams with associated wetlands and 12 wetlands not associated with a stream or drainage. Proposed rail line crossings would require 127 culverts, 4 bridges, and 26 drainage structures. Road relocations would cross 25 streams, 3 streams with associated wetlands, and 3 wetlands that are not associated with a stream. Road relocation crossings would require 31 drainage structures (Table 9.2-5).

Construction and operation of the Moon Creek Alternative would result in the same impacts on Section 303(d) Category 5 listed impaired surface waters as those described above for the Tongue River Alternative.

Moon Creek East Alternative

The Moon Creek East Alternative would require 179 surface water crossings for the proposed rail line and 25 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 157 streams, 11 streams with associated wetlands, and 11 wetlands not associated with a stream or drainage. Proposed rail line crossings would require 147 culverts, 4 bridges, and 28 drainage structures. Road relocations would cross 18 streams, 4 streams with associated wetlands, and 3 wetlands not associated with a stream or drainage. Road relocation crossings would require 24 drainage structures and 1 bridge in Otter Creek (Table 9.2-5).

Construction and operation of the Moon Creek East Alternative would result in the same impacts on Section 303(d) Category 5 listed impaired surface waters as those described above for the Tongue River Alternative.

Decker Alternatives

Decker Alternative

The Decker Alternative would require 113 surface water crossings for the proposed rail line and 16 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 110 streams, 1 stream with associated wetlands, and 2 wetlands not associated with a stream or drainage. Proposed rail line crossings would require 100 culverts, 1 bridge, and 12 drainage structures. Road relocations would cross 16 streams. Road relocation crossings would require 16 drainage structures (Table 9.2-5).

The angle at which the Decker Alternative would cross the Tongue River would create a wider channel for a bridge to span. TRRC has stated that a free-span bridge (no in-water structures) could span up to 200 feet with deck-plate girders, but the Decker Alternative's crossing of the Tongue River would just exceed this distance and would most likely need a permanent in-water support structure. Impacts from this support structure would be similar to the physical alteration of surface water flow impacts described in Section 9.2.4.1 *Impacts Common to All Build Alternatives*.

Construction and operation of the Decker Alternative would result in the same impacts on Section 303(d) Category 5 listed impaired surface waters as those described above for the Tongue River Alternative because the Tongue River is listed for the same impairments at the river crossing, and soil type and erosion potential are the same.

Decker East Alternative

The Decker East Alternative would require 113 surface water crossings for the proposed rail line and 15 surface water crossings for road relocations (Tables 9.2-4 and 9.2-5). This build alternative would cross 111 streams, 1 stream with associated wetlands, and 1 wetland not associated with a stream or drainage. Proposed rail line crossings would require 100 culverts, 1 bridge, and 12 drainage structures. Road relocations would cross 15 streams. Road relocation crossings would require 15 drainage structures (Table 9.2-5).

Construction and operation of the Decker East Alternative would result in the same impacts on Section 303(d) Category 5 listed impaired surface waters as those described for the Decker Alternative.

9.2.4.3 No-Action Alternative

Under the No-Action Alternative, TRRC would not construct and operate the proposed Tongue River Railroad, and there would be no impacts on surface waters from construction or operation of the proposed rail line.

9.2.4.4 Mitigation and Unavoidable Environmental Consequences

To avoid or minimize the environmental impacts on surface waters from construction and operation of the proposed rail line, OEA is recommending that the Board impose 22 mitigation measures, including 11 volunteered by TRRC (Chapter 19, Section 19.2.6, *Water Resources*). These measures would require TRRC to consult with the U.S. Army Corps of Engineers on riverbank stabilization, consult with county floodplain administrators, document the final design for bridges, operate all facilities to maintain existing flow conditions and hydrologic stability, clear culverts and bridges of debris, remove construction debris from water bodies, construct water crossings to minimize disturbances to streambeds and banks, conduct off-road work to maintain surface and subsurface hydrology and quality, cross streams only at designated points, use contaminant-free embankment materials, minimize fugitive dust and erosion, delineate wetlands in the right-of-way, obtain Section 404 permits, obtain Section 401 water quality certifications, comply with the terms of the Section 404 permit and Section 401 certification, implement compensatory mitigation for impacts on wetlands, design the Tongue River crossing to limit structure and fill placement in the river, construct temporary stream crossings for construction activities, conduct contractor training for use of these crossings, install temporary barricades to direct traffic across these crossings, comply with the most stringent hydraulic design criteria, maintain natural water flow and drainage, and conduct construction activity during periods of no or low flow.

Even with implementation of OEA's recommended mitigation measures and TRRC's voluntary measures, construction and operation of the proposed rail line would cause unavoidable impacts on surface waters. These impacts could include changes to natural drainage and altered hydraulics around surface water crossings, changes to channel morphology, potential for debris jams and water backup, increased channel scour and erosion, and increased turbidity, sediment loads, and concentration of pollutants during construction. OEA concludes that these impacts would be adverse.

9.3 Groundwater

This section describes the impacts on *groundwater*[1] that would result from construction and operation of each of the build alternatives. Groundwater is the subsurface water that saturates the pores and cracks in soil and rock. The subsections that follow describe the groundwater study area, the methods used to analyze groundwater impacts, the affected environment, and the impacts of the build alternatives on groundwater. The regulations and guidance related to groundwater are summarized in Section 9.6, *Applicable Regulations*. The contribution of the proposed rail line to cumulative impacts on groundwater is discussed in Chapter 18, *Cumulative Impacts*.

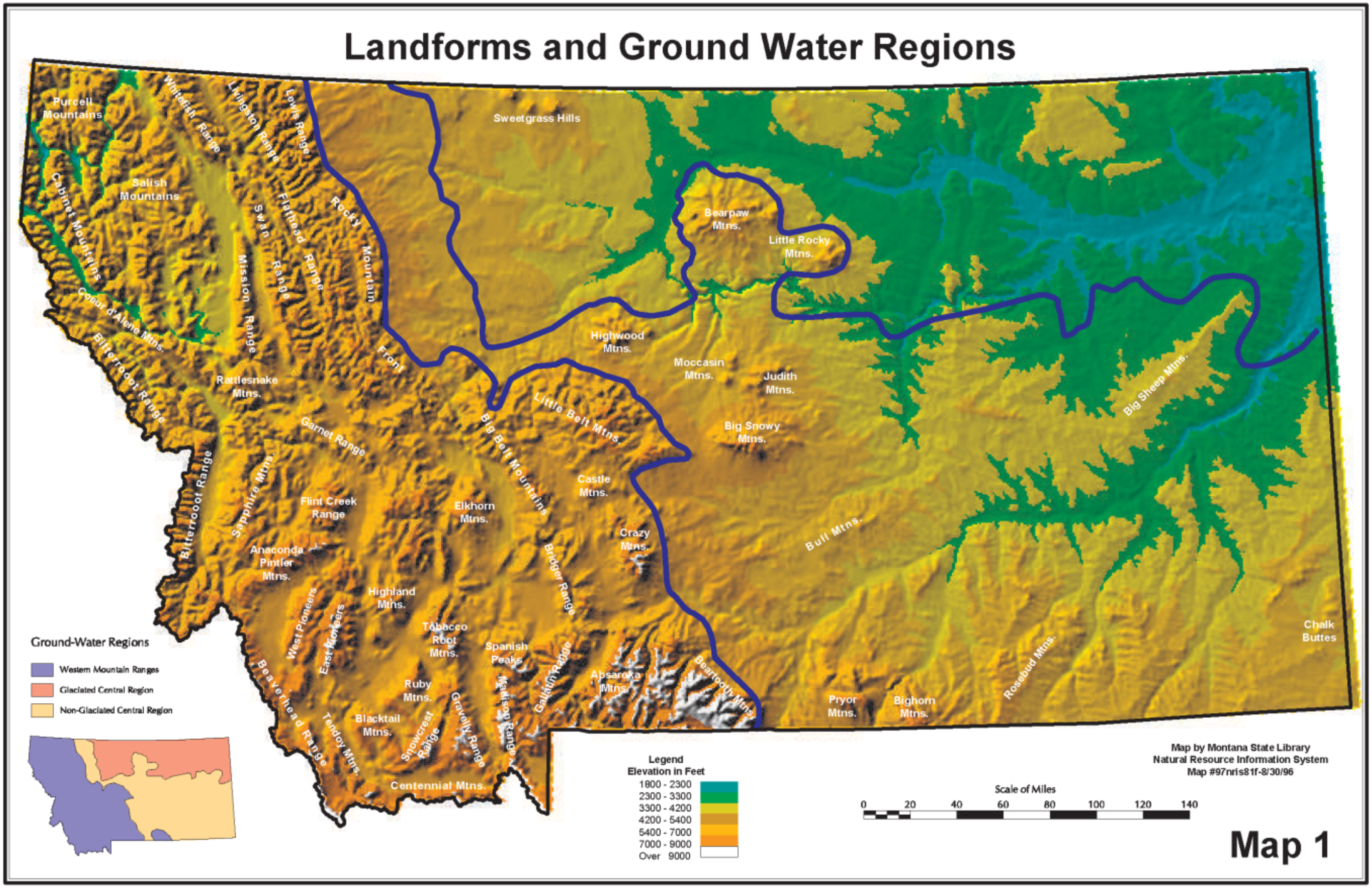
In summary, construction and operation of the proposed rail line, including the use of groundwater during construction for soil compaction and dust suppression, could alter infiltration and groundwater recharge characteristics, temporarily degrade groundwater quality, temporarily disrupt groundwater balances, and permanently close groundwater wells within the right-of-way for each build alternative. If groundwater is used during construction, the longest build alternatives would require the most groundwater (Tongue River Alternatives, Tongue River Road Alternatives, and Moon Creek Alternatives). The Colstrip Alternatives would require the least amount of groundwater. The Tongue River Road Alternatives and Colstrip Alternatives would close the most groundwater wells located in the rights-of-way, and the Decker Alternatives would close the fewest. OEA concludes that these impacts would be negligible.

9.3.1 Study Area

OEA defined the study area for groundwater as the Nonglaciated Central Groundwater Region within Big Horn, Custer, Powder River, and Rosebud Counties. The Nonglaciated Central Groundwater Region is one of three groundwater regions in Montana: Western Mountain Ranges, Glaciated Central Region, and Nonglaciated Central Region (Figure 9.3-1). The state is divided into these three groundwater regions based on the different landforms and geology (Heath 1984) in the area.

[1] Terms italicized at first use are defined in Chapter 25, *Glossary*.

Figure 9.3-1. Montana Landforms and Groundwater Regions



Source: Montana State Library 1996

9.3.2 Analysis Methods

OEA used the following methods and information to evaluate the impacts of construction and operation of the build alternatives on groundwater.

- OEA assumed that all water used for dust suppression and soil compaction during construction would be obtained from groundwater wells. OEA used this assumption to determine if there would be enough wells near the build alternatives with water rights that TRRC could purchase or lease temporarily during construction. Because OEA does not know whether the construction contractor would use groundwater during construction of the proposed rail line, this analysis provides a conservative (high) estimate of groundwater withdrawal impacts by assuming that all water used for construction would be obtained from groundwater wells.
- OEA reviewed existing groundwater and well data in the study area and assessed whether groundwater quality and quantity as well as the wells would be affected. OEA obtained geographic information system (GIS) well location data from the Montana Bureau of Mines and Geology (2013) to determine the number and location of wells that could be closed by the build alternatives. OEA then overlaid the right-of-way GIS data layer with the groundwater well GIS data layer and calculated the number of groundwater wells within the right-of-way of each build alternative. OEA assumed that any well located within the right-of-way would be closed and no longer useable.
- OEA obtained GIS water rights data from the Montana Department of Natural Resources and Conservation (DNRC) (2013) to identify locations in the study area where TRRC could withdraw groundwater for dust suppression and soil compaction during construction. The construction contractor would coordinate the purchase of water rights from the Tongue River, the Yellowstone River, water wells, or a combination thereof.

9.3.3 Affected Environment

Groundwater is an important resource in Montana, and there are no known major concerns about groundwater availability in the study area. Overall, groundwater quality in the study area is good and suitable for irrigation, livestock, and domestic purposes. Although there are thousands of groundwater wells in the state and throughout the study area—most of which are used for the purposes just described—groundwater currently represents only about three percent of the state's total water withdrawals[2] (the remainder being withdrawals from surface water).

Groundwater is the subsurface water that saturates the pores and cracks in soil and rock. Groundwater is transmitted via geologic layers called *aquifers.* Aquifers are natural reservoirs that collect and store water that comes from precipitation, snowmelt runoff, and

[2] Surface water and groundwater in Montana is used for public water supply, domestic irrigation, livestock, aquaculture, industrial operations, mining operations, and thermoelectric power.

streamflow. The water that seeps into an aquifer is called *groundwater recharge*, and places where recharge occurs are called *recharge areas*. An *unconfined aquifer* (or water-table aquifer) is recharged directly by infiltration of precipitation or surface water (e.g., rivers). *Confined aquifers* are overlain by low-permeability material (e.g., clay or rock) that limits the vertical flow of water into or out of the aquifer. Some water flowing through shallow, near-surface aquifers eventually emerges at the land surface and contributes to seeps, springs, wetlands, ponds, lakes, and streamflow. The water that reaches the surface is called *groundwater discharge*, and places where aquifers deliver water to the surface are called *discharge areas*. In general, groundwater flows away from recharge areas toward discharge areas. Most groundwater is more protected from quick contamination than surface water, depending on a contaminant's ability to permeate the overlying soils or rock. Landowners access groundwater from wells that tap into an aquifer.

There are different types of aquifers, which are characterized according to aquifer composition. *Alluvial aquifers*, the most productive sources of groundwater in Montana, are located throughout the study area in the major stream valleys and tributaries; groundwater use is heavy in these areas (Montana State Library 1996). Alluvium in the river valleys consists of gravel, sand, silt, and clay. Deposits of these sediments vary in thickness from a few feet to more than 100 feet and, in many of the larger stream valleys, are several miles in width (Montana State Library 1996).

In general, the highest quality and most accessible groundwater in the study area comes from aquifers contained in the major stream valleys and their tributaries. These aquifers are at or near the land surface and are called *surficial aquifers*. These surficial aquifers are unconfined and, thus, recharged by precipitation and surface water (e.g., Tongue River). Surficial aquifers are very important in Montana because they can be tapped by shallow wells, providing an adequate water supply for most domestic and agricultural purposes.

A *sole-source aquifer* is defined by the U.S. Environmental Protection Agency as an aquifer that supplies at least 50 percent of the drinking water consumed in an area overlying the aquifer (U.S. Environmental Protection Agency 2012). These areas may have no alternative drinking water source that could physically, legally, and economically supply all those who depend on the aquifer for drinking water. There are no sole-source aquifers in the study area (U.S. Environmental Protection Agency 2013).

9.3.3.1 Groundwater Use and Well Distribution

The U.S. Geological Survey (USGS) reports water-use estimates for the United States by state and county for eight categories of water use: public supply, domestic, industrial, irrigation, livestock, aquaculture, mining, and thermoelectric power. Most of the groundwater withdrawn in the four counties in the study area is used for irrigation (Table 9.3-1).

Table 9.3-1. Groundwater Use in Big Horn, Custer, Powder River, and Rosebud Counties (million gallons per day)

County	Public Supply	Domestic	Indus-trial	Irriga-tion	Live-stock	Aqua-culture	Mining	Thermo-electric	Total
Big Horn	0.27	0.52	0.01	4.12	1.10	0.00	1.83	0.00	7.85
Custer	0.01	0.18	0.04	0.80	0.25	0.01	0.00	0.00	1.29
Powder River	0.14	0.10	0.00	0.17	0.85	0.00	0.00	0.00	1.26
Rosebud	0.71	0.09	0.08	1.27	0.36	0.00	0.09	0.10	2.70
Total	**1.13**	**0.89**	**0.13**	**6.36**	**2.56**	**0.01**	**1.92**	**0.10**	**13.10**

Notes:
Source: Kenny et al. 2009

The private water wells that have been installed into the shallow aquifers along the stream valleys and tributaries are an important source of water for rural households, farms, ranches, and livestock. Montana water well records indicate that 90 percent of private water wells with reported depths are 400 feet deep or less, with approximately 67 percent 200 feet deep or less (Montana Department of Natural Resources and Conservation 2011).

The principal aquifers that provide groundwater to wells include the alluvium along stream valleys (i.e., surficial aquifers) and the coals and sandstones of the Fort Union and Wasatch Formations[3] (Montana Department of Natural Resources and Conservation 2011). The density of the wells in the study area ranges from 0 to 10 wells per square mile (Montana State Library 1996).

Table 9.3-2 shows the total number of water wells and statewide monitoring network wells in each county in the study area. As part of the Groundwater Monitoring Program, the Montana Bureau of Mines and Geology has established a statewide monitoring network of wells. The statewide network is designed to collect water-level data and water-quality data. There are more than 13,000 wells in the study area, of which 44 are state monitoring wells.

[3] The Fort Union Formation exists over 22,000 square miles in the Powder River Basin in Wyoming and Montana. A large part of the central part of the basin is overlain by the Wasatch Formation. These formations are geologic units containing sandstones, shales, and coalbeds.

Table 9.3-2. Water Wells in Big Horn, Custer, Powder River, and Rosebud Counties

County	Total Number of Wells[a]	Number of Monitoring Wells[b]
Big Horn	3,331	4
Custer	2,795	3
Powder River	3,856	11
Rosebud	3,692	26
Total	**13,674**	**44**

Notes:
[a] Includes monitoring wells
[b] A monitoring well is one that is part of the Montana Bureau of Mines and Geology's statewide network where the bureau collects water-level and water-quality data.
Source: Montana Bureau of Mines and Geology 2014

Table 9.3-3 shows the reported water use of the wells in each county. Based on reported water use, the majority of the wells in all four counties are used for livestock and domestic purposes.

Table 9.3-3. Well Water Uses for Custer, Rosebud, Big Horn, and Powder River Counties

	Well Water Uses by County[a]			
Water Use	Custer	Rosebud	Big Horn	Powder River
Recreation	0	1	1	0
Injection	0	0	0	1
Industrial	5	28	27	8
Public water supply	41	58	49	20
Test well	13	80	41	21
Unused	8	83	110	104
Fire protection	8	1	0	1
Monitoring[b]	224	1,000	581	190
Commercial	19	3	9	1
Irrigation	111	71	131	83
Research	0	132	202	57
Geothermal extraction	6	0	1	0
Coalbed methane	7	16	66	59
Geotech	76	32	20	69
Stock water	1,656	1,642	1,151	2,732
Domestic	1,005	886	950	829
Other	12	36	55	28
Unknown	116	93	205	87
Total	**3,307**	**4,162**	**3,599**	**4,290**

Notes:
[a] Total is greater than total number of wells in county, Table 9.3-2, because one well can have more than one reported use.
[b] The reported use by the well user, which is different from that of the 44 wells described as part of the state's Groundwater Monitoring Program.
Source: Montana Bureau of Mines and Geology 2014

According to DNRC (2013) water rights GIS data, there are hundreds of points of water use in the study area, including groundwater wells and surface waters. TRRC could obtain a lease to withdraw water from these sources. Montana Code Annotated 85-2-427 contains the requirements for a temporary lease of an appropriation right.[4] To lease an appropriation right, an appropriator (i.e., water rights holder) must submit a permit application to DNRC Water Rights Bureau. The application must include a written narrative that addresses the appropriator's plan to prevent potential adverse effects on existing water rights, certificates, permits, and water reservations, including any mitigation to reduce impacts. The appropriator's plan must demonstrate that operation of the proposed lease will not exceed historic use, including flow rate, historic diverted volume, and historic consumptive volume, and the proposed lease will be capable of being implemented and operated to prevent adverse effect (Administrative Rule of Montana 36.12.2101). Once approved by the DNRC Water Rights Bureau, the appropriator can temporarily lease its water right.

9.3.3.2 Groundwater Availability and Restrictions

Groundwater is available in shallow surficial aquifers along the major stream valleys and their tributaries, which is where the majority of groundwater use occurs in the study area. Groundwater is also available from deeper aquifers associated with the Fort Union and Wasatch Formations in the study area. Based on water rights information acquired by the Montana Department of Environmental Quality (2003) from DNRC, 830,244 acre-feet (270.5 billion gallons) of water per year in the Montana portion of the Tongue River watershed are filed as groundwater rights. There is controlled groundwater in the study area, but the controlled area applies only to wells designed and installed for the extraction of coalbed methane. No other types of groundwater uses are restricted within this controlled groundwater area, and there are no known groundwater extraction or availability concerns associated with these other uses in the study area.

9.3.3.3 Groundwater Quality

Several state and federal agencies monitor and assess Montana's groundwater: the Montana Bureau of Mines and Geology, Montana Department of Environmental Quality, Montana Department of Agriculture, DNRC, and USGS. Several factors influence the natural quality of groundwater, including the chemical composition of precipitation and snowmelt water that serves as recharge, chemical reactions occurring at the land surface and in the soil zone, and the mineral composition of sediments and rocks that make up the aquifers and confining beds (Heath 1983). Another factor that strongly influences the natural water quality in surficial

[4] A water right is a legal entitlement authorizing water to be diverted from a specified source and put to beneficial, nonwasteful use. Water rights are property rights, but their holders do not own the water itself. They possess the right to use it. Appropriative water rights are the most common use-based water rights in the United States. An appropriation is made when an individual physically takes water from a source (e.g., stream or underground aquifer) and directs that water to some type of beneficial use.

aquifers is high hydraulic conductivity, which allows water to flow relatively fast (Heath 1983). As a result, the water does not remain in the surficial aquifers for extensive periods. This means that the water has less time to dissolve soluble salts and other minerals that are present in these aquifers. As a result, the concentration of dissolved solids remains relatively low and the water is "fresh" (Montana State Library 1996). Groundwater in Montana is classified according to its quality and divided into four classes: I, II, III, and IV (Montana Department of Environmental Quality 2012), as provided in Table 9.3-4.

Table 9.3-4. Montana Groundwater Classifications

Classification	Description
I	Groundwater has a specific conductance less than 1,000 µS/cm at 25°C and is suitable for public and private water supplies, food processing, irrigation, drinking water for livestock and wildlife, and commercial and industrial purposes with little or no treatment required.
II	Groundwater has a specific conductance range of 1,000 to 2,500 µS/cm at 25°C. Public and private water supplies may use Class II groundwater where better-quality water is not available. The primary uses are irrigation, stock water, and industrial purposes.
III	Groundwater has a specific conductance range of 2,500 to 15,000 µS/cm at 25°C. Its primary use is stock water and industrial purposes. It is marginally suitable for some salt-tolerant crops.
IV	Groundwater has a specific conductance greater than 15,000 µS/cm at 25ºC. Used primarily for industrial purposes.

Notes:
Source: Montana Department of Environmental Quality 2012
µS/cm = microsiemens per centimeter (units for electrical conductivity); °C = degrees Celsius

Specific conductance is the measurement of water's ability to conduct electrical current and a general measure of the water's salinity, or the amount of dissolved solids in the water (salts and minerals). Specific conductance can be used as a general indicator of water quality. Low specific conductance indicates a low dissolved solids concentration and implies good quality water. Higher specific conductance values indicate greater amounts of dissolved solids. In general, the larger the specific conductance, the poorer the quality of water.

In 1996, the Montana State Library compiled water quality data for the entire state (Montana State Library 1996). In the study area, most of the specific conductance data fell into Classes II and III (Table 9.3-4), which support the high reported use of stock water (Table 9.3-3). Most of the water data came from wells installed in surficial aquifers. Surficial aquifers in Montana, as a whole, have very good water quality. In the eastern part of the state, there is more variability but water quality is good overall (Montana State Library 1996). Because TRRC intends to use the water for dust suppression and soil compaction, the quality of the water would not be a concern for these uses.

9.3.4 Environmental Consequences

Impacts on groundwater could result from construction and operation of any build alternative. The impacts common to all build alternatives are presented first, followed by impacts specific to the build alternatives.

Coal dust impacts on groundwater are assessed in Chapter 6, *Coal Dust*. OEA used U.S. Environmental Protection Agency soil screening levels to evaluate human exposure to coal dust that has migrated to groundwater. The soil screening levels are threshold levels for contaminants migrating from soil to groundwater. OEA determined that coal dust constituent concentrations in groundwater were below screening levels for exposure (Chapter 6, *Coal Dust*).

9.3.4.1 Impacts Common to All Build Alternatives

Construction

Construction-related impacts would result from construction of the proposed rail line, access roads, bridges and culverts, staging areas, and associated project facilities (support facilities and communication towers). TRRC plans to use water for dust suppression and soil compaction during construction through a contractor-coordinated purchase of water rights access to the Tongue River, the Yellowstone River, water wells, or a combination thereof. Groundwater impacts would result from groundwater withdrawals for dust suppression and soil compaction if the construction contractor uses groundwater instead of surface water.

The following construction impacts on groundwater are common to all build alternatives.

- **Alter Infiltration and Recharge Characteristics and Degrade Water Quality**

  Construction of the proposed rail line, access roads, staging areas, and associated facilities would alter infiltration and recharge characteristics and permanently reduce or impede infiltration due to surface soil compaction and the creation of impenetrable surfaces (e.g., maintenance building and other structures). These impacts would be limited to the footprint of each of these project components. Because the major aquifers in the study area are recharged by precipitation and surface water, the total project footprint represents a small fraction of the total recharge area. That is, the proposed rail line’s footprint and associated facilities account for a small portion of the total land area in the study area and significant alterations to infiltration and recharge would not be anticipated. Any accidental contaminant released to the ground during construction could infiltrate and temporarily degrade groundwater quality if the contaminant were to reach groundwater. However, by implementing best management practices during construction, the likelihood of a large contaminant spill is low. In addition, because clean-up procedures would commence immediately after a spill, it would be unlikely that a large amount of contaminants would reach groundwater and impair quality. No long-term impacts are anticipated.

- **Disrupt Water Balances**

  TRRC could easily purchase water rights and obtain lease agreements for water from the plentiful supply in the study area (Montana Department of Natural Resources and

Conservation 2013). Assuming TRRC uses groundwater wells for all of its water supply, there could be temporary impacts on local water balances if the cumulative withdrawal rate by all users exceeds the natural recharge rate for that aquifer. Withdrawing groundwater would temporarily lower the local water table and reduce discharges to streams or other surface waters. This would affect any groundwater or surface water users in the area. The level of impact would depend on site conditions and water withdrawal rates.

Based on the estimated amount of water needed for construction (Table 9.3-6), groundwater withdrawals would temporarily affect groundwater levels. TRRC would comply with the appropriator's temporary lease requirements, which would prevent any short-term or long-term impacts. The appropriator's plan must demonstrate that operation of the proposed lease will not exceed historic use, including flow rate, historic diverted volume, and historic consumptive volume, and the proposed lease will be capable of being implemented and operated to prevent adverse effect (Administrative Rule of Montana 36.12.2101). Therefore, adverse impacts of these water withdrawals on groundwater levels are not expected.

- **Permanently Close Wells in the Right-of-Way**

  Groundwater wells within the right-of-way would be closed and no longer available to water users. Groundwater would no longer be extracted from these wells, which could increase the amount of water in the aquifer and, thus, the water available for discharge to surface waters and available for withdrawal at other nearby wells.

Operation

The following operation impact is common to all build alternatives. The severity of the impact would vary depending on the volume of train traffic and required maintenance.

- **Degrade Water Quality**

  Any accidental contaminant (e.g., diesel fuel) released to the ground during operation could infiltrate into the ground and temporarily degrade groundwater quality if the contaminate were to reach groundwater. However, by implementing best management practices during operation, the likelihood of a large contaminant spill is low. In addition, because clean-up procedures would commence immediately after a spill, it would be unlikely that a large amount of contaminants would reach groundwater and impair quality. No long-term impacts are anticipated.

9.3.4.2 Impacts by Build Alternative

The impacts on groundwater that are specific to each build alternative are described below and are represented in the following tables.

- Table 9.3-5 shows the number of water wells located within the build alternatives' rights-of-way.
- Table 9.3-6 shows the estimated amount of water required during construction for each build alternative.

Table 9.3-5. Water Wells within the Build Alternatives' Rights-of-Way

Build Alternative	Number of Wells[a]
Tongue River	7
Tongue River East	5
Colstrip	9
Colstrip East	7
Tongue River Road	10
Tongue River Road East	8
Moon Creek	7
Moon Creek East	5
Decker	1
Decker East	1

Notes:
[a] No wells are part of the state's network of monitoring wells located within the rights-of-way. The geospatial data for the wells does not indicate the reported use of the wells.
Source: Montana Bureau of Mines and Geology 2013

Table 9.3-6. Estimated Water Use for Construction

Build Alternative	Amount (gallons)[a]	Percent of Annual Allocation[b]	Average Daily Withdrawal (gallons/day)[c]	Percent of 2005 Withdrawal[d]
Tongue River	395,583,635	0.15	549,422/659,306	4.19/5.03
Tongue River East	591,420,344	0.22	518,790/657,134	3.96/5.02
Colstrip	297,176,503	0.11	495,294/619,118	3.78/4.73
Colstrip East	390,370,012	0.14	433,744/591,470	3.31/4.52
Tongue River Road	592,072,046	0.22	548,215/657,858	4.18/5.02
Tongue River Road East	677,119,269	0.25	501,570/626,962	3.83/4.79
Moon Creek	587,510,126	0.22	543,991/652,789	4.15/4.98
Moon Creek East	783,346,835	0.29	522,231/652,789	3.99/4.98
Decker	725,996,984	0.27	537,776/691,426	4.11/5.28
Decker East	736,750,081	0.27	545,741/701,667	4.17/5.36

Notes:
[a] Assumes all water needed for construction would be obtained from existing groundwater wells
[b] Based on allocated water rights information acquired by the Montana Department of Environmental Quality (2003) from the Montana Department of Natural Resources and Conservation, 830,244 acre-feet (270.5 billion gallons, with 1 acre-foot = 325,851.429 gallons) of water per year in the Montana portion of the Tongue River watershed are filed as groundwater rights. Water volumes are allocated by DNRC when a water right is established at a groundwater well or surface water withdrawal location.
[c] These values are based on the approximate duration of construction (Chapter 2, Table 2-3). The first value assumes an 8-month construction schedule but is averaged for the entire year for comparison with annual groundwater withdrawal in the study area. The second value assumes a 12-month construction schedule.
[d] In 2005, an estimated 13.1 million gallons of groundwater per day were withdrawn from the four counties composing the study area (Table 9.3-1). The first value assumes an 8-month construction schedule but is averaged for the entire year for comparison with annual groundwater withdrawal in the study area. The second value assumes a 12-month construction schedule.

Potential groundwater impacts specific to each build alternative would include the amount of water withdrawn to support construction activities and the number of water wells within the right-of-way that would be closed. As discussed in Section 9.3.4.1, *Impacts Common to All Build Alternatives*, TRRC would use water during construction through a contractor-coordinated purchase of water rights access to the Tongue River, the Yellowstone River, water wells, or a combination thereof.

Tongue River Alternatives

Tongue River Alternative

Construction of the Tongue River Alternative would permanently close seven wells within the right-of-way (Table 9.3-5). Construction would require an estimated 395.6 million gallons of water over an estimated 20 to 24 months, depending on the length of the construction season.[5] This amount represents 0.15 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights. This amount also represents 4.19 or 5.03 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area (Table 9.3-6).

Tongue River East Alternative

Construction of the Tongue River East Alternative would permanently close five wells within the right-of-way (Table 9.3-5). Construction would require an estimated 591.4 million gallons of water over an estimated 30 to 38 months, depending on the length of the construction season. This amount represents 0.22 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights (Table 9.3-6). This amount also represents 3.96 or 5.02 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area.

Colstrip Alternatives

Colstrip Alternative

Construction of the Colstrip Alternative would permanently close nine wells within the right-of-way (Table 9.3-5). Construction would require an estimated 297.2 million gallons of water over an estimated 16 to 20 months, depending on the length of the construction season (Table 9.3-6). This amount represents 0.11 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights. This

[5] The construction duration would differ for each build alternative based on the length of the alignment and the terrain it would cross. Chapter 2, Section 2.2.9, *Construction Schedule*, identifies the construction schedule for each build alternative

amount also represents 3.78 or 4.73 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area (Table 9.3-6).

Colstrip East Alternative

Construction of the Colstrip East Alternative would permanently close seven wells within the right-of-way (Table 9.3-5). Construction would require an estimated 390.4 million gallons of water over an estimated 22 to 30 months, depending on the length of the construction season (Table 9.3-6). This amount represents 0.14 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights. This amount also represents 3.31 or 4.52 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area (Table 9.3-6).

Tongue River Road Alternatives

Tongue River Road Alternative

Construction of the Tongue River Road Alternative would permanently close 10 wells within the right-of-way (Table 9.3-5). Construction would require an estimated 592.1 million gallons of water over an estimated 30 to 36 months, depending on the length of the construction season (Table 9.3-6). This amount represents 0.22 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights. This amount also represents 4.18 or 5.02 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area (Table 9.3-6).

Tongue River Road East Alternative

Construction of the Tongue River Road East Alternative would permanently close eight wells within the right-of-way (Table 9.3-5). Construction would require an estimated 677.1 million gallons of water over an estimated 36 to 45 months, depending on the length of the construction season (Table 9.3-6). This amount represents 0.25 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights. This amount also represents 3.83 or 4.79 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area (Table 9.3-6).

Moon Creek Alternatives

Moon Creek Alternative

Construction of the Moon Creek Alternative would permanently close seven wells within the right-of-way (Table 9.3-5). Construction would require an estimated 587.5 million gallons of water over an estimated 30 to 36 months, depending on the length of the construction season

(Table 9.3-6). This amount represents 0.22 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights. This amount also represents 4.15 to 4.98 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area (Table 9.3-6).

Moon Creek East Alternative

Construction of the Moon Creek East Alternative would permanently close five wells within the right-of-way (Table 9.3-5). Construction would require an estimated 783.3 million gallons of water over an estimated 40 to 50 months, depending on the length of the construction season (Table 9.3-6). This amount represents 0.29 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights. This amount also represents 3.99 or 4.98 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area (Table 9.3-6).

Decker Alternatives

Decker Alternative

Construction of the Decker Alternative would permanently close one well within the right-of-way (Table 9.3-5). Construction would require an estimated 726.0 million gallons of water over an estimated 35 to 45 months, depending on the length of the construction season (Table 9.3-6). This amount represents 0.27 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights. This amount also represents 4.11 or 5.28 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area (Table 9.3-6).

Decker East Alternative

Construction of the Decker East Alternative would also permanently close one well within the right-of-way (Table 9.3-5). Construction would require an estimated 736.8 million gallons of water over an estimated 35 to 45 months, depending on the length of the construction season (Table 9.3-6). This amount represents 0.27 percent of the amount of groundwater per year in the Montana portion of the Tongue River watershed filed as groundwater rights. This amount also represents 4.17 or 5.36 percent (depending on the length of the construction season) of the total amount of groundwater withdrawn daily from all four counties in the study area (Table 9.3-6).

9.3.4.3 No-Action Alternative

Under the No-Action Alternative, TRRC would not construct and operate the proposed Tongue River Railroad, and there would be no impacts on groundwater from construction or operation of the proposed rail line.

9.3.4.4 Mitigation and Unavoidable Environmental Consequences

To avoid or minimize environmental impacts on groundwater from the proposed rail line, OEA is recommending that the Board impose four mitigation measures, including one volunteered by TRRC (Chapter 19, Section 19.2.6, *Water Resources*). These measures would require TRRC to submit detailed construction plans to the Montana Department of Environmental Quality, replace each active well removed from the right-of-way as possible, minimize fugitive dust and erosion, and comply with the regulations of the Hazardous Materials Transportation Act to minimize impacts from accidental spills of hazardous contaminants.

Even with the implementation of OEA's recommended mitigation measures, construction and operation of the proposed rail line would cause unavoidable impacts on groundwater. These impacts could include altered infiltration recharge characteristics and temporary degradation of groundwater quality. OEA concludes that these impacts would be negligible.

9.4 Floodplains

This section describes the impacts on floodplains that could result from the construction and operation of each of the build alternatives. *Floodplains*[1] are defined as any land area susceptible to being inundated by water from any source (44 Code of Federal Regulations [C.F.R.]). They are typically lowland areas that adjoin inland and coastal waters that are periodically inundated by floodwaters. The subsections that follow describe the study area, methods used to analyze the impacts, affected environment, and the impacts of the build alternatives on floodplains. The regulations and guidance related to floodplains are summarized in Section 9.6, *Applicable Regulations*. The contribution of the proposed rail line to cumulative impacts on floodplains is discussed in Chapter 18, *Cumulative Impacts*.

In summary, the Tongue River Alternatives and the Tongue River Road Alternatives would affect the greatest area of floodplains (approximately 113 acres for each build alternative) and the Decker East Alternative would affect the least area of floodplains (9 acres). OEA concludes that these adverse impacts would be minor.

9.4.1 Study Area

OEA defined the study area for floodplains as follows.

- The right-of-way of each build alternative and each road relocation that would cross floodplains at stream or other surface water crossings.
- The right-of-way of each build alternative and each road relocation that would run parallel to a stream or other surface water and encroach on the associated floodplain.

9.4.2 Analysis Methods

OEA used the following methods, information, and assumptions to evaluate the impacts of construction and operation of the build alternatives on floodplains. These methods are summarized here and explained in more detail in the subsections that follow.

- OEA identified floodplains in the study area based on existing FEMA floodplain mapping data and NRCS-mapped soil data with a focus on soil types that are susceptible to flooding. The NRCS data were used to estimate floodplain areas where FEMA has not mapped floodplains in the study area.
- OEA assumed the entire right-of-way would be disturbed during rail construction by clearing, excavation, and placement of fill material. Some areas would be permanently disturbed (e.g., the rail line footprint) and some areas would be temporarily disturbed. It is unlikely that the entire right-of-way would actually be disturbed during construction,

[1] Terms italicized at first use are defined in Chapter 25, *Glossary*.

but the exact locations of permanent and temporary disturbance in the right-of-way are unknown at this time and would be determined during final engineering and design. Therefore, OEA's assumption that the entire right-of-way would be disturbed likely overestimated the actual floodplain impacts.

9.4.2.1 FEMA Floodplain Mapping

OEA initially identified floodplains in the study area by reviewing existing FEMA Flood Insurance Rate Maps (FIRMs) that have been developed for Custer, Rosebud, Powder River, and Big Horn Counties. FIRMs are the official maps on which FEMA delineates the special flood hazard areas (SFHAs) for regulatory purposes under the National Flood Insurance Program (NFIP). SFHAs are also known as *100-year floodplains*, which are areas that have a 1 percent annual chance of flooding. The NFIP offers flood insurance to homeowners, renters, and businesses, and the floodplains mapped on FIRMs are an important aspect of the NFIP. An SFHA is the area where the NFIP floodplain management regulations must be enforced. The entire study area is covered by 29 FIRMs.

FEMA has mapped floodplains on six of the 29 FIRMs that cover the study area. FEMA may not map floodplains on a FIRM because the area may be undeveloped and without structures requiring insurance; therefore, there is no need for FEMA to map floodplains for regulatory purposes under the NFIP. For example, many FIRMs in Rosebud County that cover the study area note that the covered area is an undeveloped area, which indicates that FEMA has determined that there would be no purpose in mapping floodplains at this time because the area is undeveloped with few or no homeowners, renters, or businesses to offer flood insurance through the NFIP. For the remaining 23 FIRMs that cover the study area, FEMA has not mapped floodplains at this time for the purposes of the NFIP.

The six FIRMs that FEMA has mapped floodplains for cover the northernmost 5.35 miles of the Tongue River Alternatives and Tongue River Road Alternatives approaching the Miles City terminus (covered by two FIRMs) (Federal Emergency Management Agency 2010), 15.7 miles of the Colstrip Alternatives starting just west of the Tongue River (covered by two FIRMs) (Federal Emergency Management Agency 1997), and the southernmost 6.85 miles of the Decker Alternatives approaching the southern terminus (covered by two FIRMs) (Federal Emergency Management Agency 1981). The two FIRMs covering the Tongue River Alternatives and Tongue River Road Alternatives are the only ones that are available in digital geographic information system (GIS) format. The remaining four FIRMs that cover the Colstrip Alternatives and Decker Alternatives can be reviewed and printed from FEMA's mapping center website. For the impact analysis along the Tongue River Alternatives and Tongue River Road Alternatives, OEA overlaid the right-of-way GIS layer with the FEMA-mapped SFHA GIS layer to calculate acreages of SFHAs in the rights-of-way. For the areas along the Colstrip Alternatives, Decker Alternatives, Tongue River Alternatives, and Tongue River Road Alternatives where FIRMs are not available in GIS format, OEA converted FIRM data to digital GIS format (this is known as *georeferencing*) to calculate acreages of SFHAs in the rights-of-way.

9.4.2.2 NRCS-Mapped Floodplain Areas

To supplement the 23 FIRMs for which FEMA has not mapped floodplains, OEA estimated floodplains across the entire study area based on the NRCS flood frequency classification for the different soil types mapped by NRCS in the study area. There are five NRCS flood frequency classifications for mapped soils: very rare, rare, occasional, frequent, and very frequent (Natural Resources Conservation Service 2013).

- **Very rare flooding** is very unlikely but possible under extremely unusual weather conditions; less than 1 percent chance of flooding in any year or less than once in 100 years but more than once in 500 years.
- **Rare flooding** is unlikely but possible under unusual weather conditions; there is a 1 to 5 percent chance of flooding in any year or nearly 1 to 5 times in 100 years.
- **Occasional flooding** is expected infrequently under usual weather conditions; there is a 5 to 50 percent chance of flooding in any year or 5 to 50 times in 100 years.
- **Frequent flooding** is likely to occur often under usual weather conditions; there is more than a 50 percent chance of flooding in any year (i.e., more than 50 times in 100 years), but less than a 50 percent chance of flooding in all months in any year.
- **Very frequent flooding** is likely to occur very often under usual weather conditions; there is more than a 50 percent chance of flooding in all months of any year.

The NRCS flood frequency data are based on soil properties and other evidence collected during NRCS soil survey fieldwork. OEA overlaid the right-of-way GIS data layer with the NRCS soils survey GIS data layer to calculate potential floodplain areas in the build alternatives' rights-of-way and road relocations.

9.4.2.3 Smaller Streams and Surface Waters

To inform the analysis, OEA examined the number of streams crossed by each build alternative to account for small, narrow streams that may have a very narrow floodplain area not captured by the scale of FEMA mapping or NRCS soil mapping. While any floodplain area along small streams would likely be small (if present), the total number of streams crossed by a build alternative indicates the potential for floodplain impacts because a greater number of stream crossings indicates a greater potential for impacts on floodplains.

9.4.3 Affected Environment

Floodplains are valued for their natural flood and erosion control, enhancement of biological productivity, and socioeconomic benefits and functions. For human communities, however, floodplains can be considered a hazard area because buildings, structures, and properties located in floodplains can be inundated and damaged during floods.

The two primary *watersheds* that would be crossed by the proposed rail line are the Tongue River watershed (all build alternatives) and Rosebud Creek watershed (Colstrip Alternatives) (Section 9.2, *Surface Water*, provides more information on these watersheds). FEMA has mapped the 100-year floodplain of the Tongue River in portions of Custer and Big Horn Counties along the Tongue River Alternatives, Tongue River Road Alternatives, and Decker Alternatives, as well as Rosebud Creek and Greenleaf Creek along the Colstrip Alternatives. FEMA has also mapped one *floodway* in the Tongue River, but the proposed rail line would not cross the floodway. A floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Based on the NRCS soil flood frequency data, soils mapped along the build alternatives experience frequent, occasional, or rare flooding primarily associated with stream crossings. Some of these areas are mapped adjacent to where a build alternative would run parallel to a stream.

9.4.3.1 Tongue River Watershed

Flooding events do occur in the Tongue River watershed, but the Tongue River Dam and Reservoir—approximately 10 miles downstream (north) of the Montana-Wyoming state line and near the southern terminus of the Decker Alternatives—provides flood protection for the Tongue River watershed. The *hydrology* of the Tongue River system has been modified through the stabilizing effect of the reservoir (Natural Resources Conservation Service 2002). The multipurpose dam and reservoir provide water for irrigation, recreation, and flood protection. The dam was constructed between 1937 and 1940 and was administered by the Montana Water Conservation Board until 1972. At that time, management responsibilities were passed to the newly founded Montana Department of Natural Resources and Conservation. In 1978, a significant flood caused damage to the dam's concrete spillway, which is the part of the dam that allows water to freely flow over the dam during higher flood flows. The flood approached the 100-year flood level with a peak inflow of approximately 17,000 cubic feet per second (cfs), causing $1 million in erosion damage around the existing concrete spillway, which threatened to breach the dam. In July 1999, the dam was rehabilitated in response to the flood damage. The dam now includes a 61,200-cfs emergency spillway, a 38,800-cfs primary spillway, a new *primary outlet tunnel*, and an upgraded *auxiliary outlet tunnel*. The new two-spillway system has the capacity to pass a flow of 100,000 cfs and withstand a 159,200-cfs top-of-dam flood. The new primary spillway allowed the reservoir to be raised by 4 feet and increase its capacity from 67,000 to 79,071 acre-feet. An additional 400 acres have been submerged, bringing the total impounded area to 3,612 acres.

In 2002, NRCS conducted a corridor assessment of the Tongue River that described the physical characteristics and hydrology of the river. Just below the Tongue River Dam, bedrock outcrops with a narrow canyon control the Tongue River channel where no flooding can occur. Below the confines of the canyon to the mouth of the river, channel *slope* *gradient* decreases and *sinuosity* increases. As with most streams connected to the Yellowstone River, the Tongue River channel has experienced streambed erosion, resulting in high flows having less access to spread out over the channel's floodplain. The lower 20 miles of the Tongue River are primarily affected by the Tongue River Diversion Dam, limiting flows during low water periods. Below this dam, the Tongue River has developed a functioning floodplain within the incised channel, and dikes and other channel modifications near Miles City limit the natural potential of the channel to reach its full function, including floodplain functions. The channel and corridor below the Tongue River Diversion Dam have been manipulated to a moderate degree by human influences. Dikes, rock *riprap*, bridges, transportation routes, and other in-channel structures have modified attributes of the channel and potentially altered its capacity. In other parts of the Tongue River watershed, heavy rains occasionally cause flash flooding in isolated watersheds, but large-scale flooding of the principal streams rarely occurs. More common is ice-jam flooding in late winter or early spring caused by more rapid thawing in upstream than downstream areas.

The historical record of Tongue River floods demonstrates that flooding is not completely absent from the watershed, but floods have also not reached major flood status, possibly due to the Tongue River Dam and Reservoir providing flood protection to the watershed and altering the dynamics of the river. The National Oceanic and Atmospheric Administration (NOAA) National Weather Service has summarized Tongue River flood data based on data compiled at two U.S. Geological Survey (USGS) stream gages—one at Miles City and one near Birney, Montana. Table 9.4-1 summarizes the top 10 historical crests and flood stages of the Tongue River at each gage. Flood stages are defined by the National Weather Service as follows.

- **Major flood** is an event that causes extensive inundation and property damage. It is usually characterized by the evacuation of people and livestock and closure of primary and secondary roads.
- **Moderate flood** is an event that causes closures of secondary roads. Transfer to higher elevation may be necessary to save property. Some evacuations may be required.
- **Minor flood** is an event that causes some public inconvenience but minimal or no property damage.

Major tributaries of the Tongue River below the Tongue River Dam and Reservoir include Otter Creek, Pumpkin Creek, and Hanging Woman Creek (Montana Department of Natural Resources and Conservation 2011). Only Otter Creek would be crossed by the proposed rail line.

Table 9.4-1. Top Ten Historical River Crests on Tongue River downstream of the Tongue River Dam

Near Birney, MT[a] (feet)	Date	Flood Stage
7.30	June 12, 2011	Moderate
7.06	June 9,2007	Moderate
6.92	February 8, 1996	Minor
6.69	June 13, 1999	Minor
6.43	June 14, 1984	Minor
6.03	June 13, 2010	Minor
5.99	June 21, 2008	Below
5.94	June 17, 1997	Below
5.84	June 22, 1995	Below
5.28	May 31, 1996	Below
At Miles City, MT[a]	**Date**	**Flood Stage**
13.99	May 21, 2011	Moderate
13.27	February 15, 1971	Moderate
12.10	March 4, 1994	Minor
11.8	March 6, 1949	Minor
11.33	June 15, 1962	Minor
10.97	June 8, 2007	Minor
10.76	April 4, 1965	Minor
10.55	March 18, 1969	Minor
10.4	May 7, 1975	Minor
10.18	May 23, 1978	Minor

Notes:
Near Birney, minor flood stage is 6 feet, moderate flood stage is 7 feet, major flood stage is 8 feet. At Miles City, minor flood stage is 10 feet, moderate flood stage is 13 feet, major flood stage is 15 feet.
[a] Gage height set at zero for NOAA river flood stage reference
Source: National Oceanic and Atmospheric Administration 2013

Otter Creek Watershed

The National Weather Service has not summarized flood data for Otter Creek, but the flood frequency of Otter Creek has been estimated by USGS based on discharge (cfs) and watershed characteristics. Peak discharge would need to reach 818 cfs to meet the estimated 1 percent exceedance probability, which would equate to a 100-year flood flow. A review of peak discharge data for Otter Creek between 1973 and 2012 indicates that the 100-year flood flow has never been reached in Otter Creek. The highest peak flow was recorded in 1978 (425 cfs). These data were collected at a USGS stream gage approximately 2 miles downstream of where the build alternatives cross Otter Creek. Otter Creek not reaching the 100-year flood flow appears to be consistent with the NRCS assessment of Otter Creek. The creek was found to be incised to an extent of 12 to 15 feet below the valley floor. This incision limits the capability of the channel to fulfill natural stream corridor functions and cuts the stream off from its access to the historic floodplain (Natural Resources Conservation Service 2002). Table 9.4-2 lists the top five highest peak flows recorded for Otter Creek.

Table 9.4-2. Five Highest Recorded Peak Streamflows of Otter Creek

Peak Streamflow (cfs)	Date
425	March 21, 1978
350	March 6, 1994
347	May 25, 2011
341	March 6, 1975
300	June 8, 2007

Notes:
Period of record is 1974 through 2012 for U.S. Geological Survey stream gage 06307740 at Ashland, Montana
Source: U.S. Geological Survey 2014a

9.4.3.2 Rosebud Creek Watershed

The National Weather Service has not summarized flood data for Rosebud Creek, but flood frequency of Rosebud Creek has been estimated by USGS based on discharge (cfs) and watershed characteristics. Peak discharge would need to reach 1,250 cfs to meet the estimated 1 percent exceedance probability, which would equate to a 100-year flood flow. A review of peak discharge data for Rosebud Creek between 1975 and 2006, and 2011, indicates that the 100-year flood flow was reached in spring 2011 with a peak discharge recording of 1,350 cfs. The next-highest peak flow was recorded in 1994 (754 cfs). These data were collected at a USGS stream gage approximately 6.5 miles upstream of where the Colstrip Alternatives would cross Rosebud Creek. Table 9.4-3 lists the top five highest peak flows recorded for Rosebud Creek.

Table 9.4-3. Five Highest Recorded Peak Streamflows of Rosebud Creek

Peak Streamflow (cfs)	Date
1,350	May 22, 2011
754	March 2, 1994
605	March 21, 1978
493	March 18, 2003
472	February 12, 1996

Notes:
Period of record is 1975 through 2006 and 2011, for U.S. Geological Survey stream gage 06295250 near Colstrip, Montana
Source: U.S. Geological Survey 2014b

9.4.4 Environmental Consequences

Impacts on floodplains could result from construction and operation of any build alternative. The impacts common to all build alternatives are presented first, followed by impacts specific to the build alternatives.

Other sections of this Draft EIS address impacts on other resources that could be associated with floodplains, such as Section 8.3, *Wildlife*, Section 8.4, *Fish*, Section 8.5, *Special Status Species*, Section 9.2, *Surface Water*, and Section 9.5, *Wetlands*.

9.4.4.1 Impacts Common to All Build Alternatives

Construction

Construction of the proposed rail line would require clearing, excavating, and filling the rights-of-way and installing culverts (structures that carry water under roads or rail lines) and bridges, which would result in the permanent loss or alteration of floodplain areas and floodplain function. Similar construction activities would be required for road relocations. The extent of such impacts would vary based on the topographic modification required for construction, which would depend on the location or design characteristics of the proposed rail line as determined during the final design and permitting processes. In addition, the proposed rail line would be designed to meet the requirements of the Montana State Floodplain Hazard Management Regulations (Montana Department of Natural Resources and Conservation 2014). These requirements state that any development in a regulated floodplain must not increase the 100-year flood elevation more than 6 inches, unless otherwise approved by the local city or county floodplain administrator.[2] Therefore, the impacts described below should be considered in the context of this regulatory requirement.

Further, the proposed rail line would have to comply with Montana Code Annotated 69-14-240, which requires railroads to construct and maintain suitable ditches and drains along each side of the railroad, or to construct culverts or openings through the railroad to connect with ditches, drains, or watercourses. These features would drain water along the railroad right-of-way whenever draining has been obstructed and water is accumulated in the right-of-way and property adjacent to the right-of-way by the construction of the railroad.

The following construction impacts on floodplains are common to all build alternatives.

- **Decrease Floodplain Storage Capacity and Divert Flood Flows with Fill Placement**

  Construction of the proposed rail line and road relocations would require fill to be placed in the floodplains. The proposed rail line and road relocations would either cross a stream and floodplain perpendicularly, or would run parallel to and encroach on a floodplain along a stream. Placement of fill in a floodplain can reduce the floodplain's storage capacity, resulting in more floodwater downstream and an increase in floodwater levels. Placement of fill material would also constrict flood flow paths and increase floodwater elevation upstream of the constriction, resulting in a backup of floodwaters and potential upstream flooding. Placement of fill would also redirect flood flows to existing channels, leading to channel erosion and the potential alteration of channel alignment.

  Temporary construction staging areas could be located in floodplains within the right-of-way. In the unlikely event that a construction staging area is needed in a

[2] The local city or county floodplain administrator implements both the state and FEMA floodplain regulations in Montana.

floodplain, natural drainage patterns would be affected should a flood occur. This would block or divert flood flows, which would reduce flood capacity and increase flooding elevations.

- **Constrict Flood Flows with Bridge and Culvert Construction**

  Construction of bridges and culverts would affect floodplains and flood flows. Typically, bridge spans are supported by building up the edges of the streambank, installing bridge abutments, and setting the bridge on top. Similarly, placement of culverts requires building up the edges of the bank as the proposed rail line approaches the culverted stream crossing. Water flow during a flood is restricted at the culvert and bridge locations because of the artificially narrowed streambank. This restriction would result in two impacts: flow would back up behind the bridge or culvert and sediments would drop in the streambed, upstream of the structure, and water flow would accelerate as it passes under the bridge or through the culvert in the narrow channel, which could increase the flow’s erosive force downstream of the structure. These impacts could lead to changes in channel alignment, increased erosion, increased channel migration, and the potential for increased flooding upstream.

  The diversion of stream flows during bridge and culvert construction would also affect floodplains and flood flows. Diversion would temporarily reduce channel capacity in the area of construction, leading to higher floodwaters in surrounding areas.

- **Decrease Floodplain Floodwater Retention**

  Clearing floodplain vegetation would remove a floodplain’s capacity to slow down, retain, and absorb floodwaters. Denser floodplain vegetation has a greater ability to provide this function. The result of clearing floodplain vegetation would lead to increased downstream flood flows, sedimentation, channel erosion, and flooding.

Operation

The following operation impact is common to all build alternatives. The severity of the impact would vary depending on the number of stream crossings, crossing structure, and area of fill material that would be placed in the floodplains.

- **Alter Flood Dynamics from Presence of Rail Infrastructure**

  The proposed rail line, bridges, culverts, road relocations, and associated rail facilities that would be placed in floodplains could change floodplain hydraulics, which could alter channel alignment and channel erosion. Channel stabilization measures, such as riprap, designed to protect the proposed rail line from channel migration, could increase channel migration upstream and downstream by altering flow velocities and erosive forces.

  Deposition of soils and debris and accumulations of ice during cold weather could obstruct culverts and block flows. Such obstructions would reduce the conveyance capacity of the culvert and lead to increased flooding near the culvert crossing.

9.4.4.2 Impacts by Build Alternative

The impacts on floodplains that are specific to each build alternative are described below and are represented in the following tables and figures.

- Table 9.4-4 summarizes the floodplain impacts within the rights-of-way for each build alternative.
- Table 9.4-5 summarizes the floodplain impacts associated with road relocations.
- Figure 9.4-1 shows FEMA-mapped floodplain crossings (Figure 9.4-1a) and major river and tributary floodplain crossings (Otter Creek is the only major tributary crossed with a mapped floodplain) with NRCS soil-based mapped floodplains (Figures 9.4-1b and 9.4-1c).

Table 9.4-4. Road Relocation and Rail Line Floodplain Impacts Within the Right-of-Way

Build Alternative	Length within FEMA-Mapped 100-Year Floodplain (linear feet)	Area within FEMA-Mapped 100-Year Floodplain (acres)	Area within NRCS Floodplains (acres)[a]	Number of Surface Water Crossings[b]
Tongue River	3,640	14	112	145
Tongue River East	3,640	14	64	167
Colstrip	1,905	13	88	62
Colstrip East	1,905	13	42	82
Tongue River Road	3,640	14	113	169
Tongue River Road East	3,640	14	65	189
Moon Creek	0	0	105	157
Moon Creek East	0	0	57	179
Decker	0	0	13	113
Decker East	0	0	9	113

Notes:
Floodplain impacts within the right-of-way include road relocation impacts. Road relocation impacts outside of the right-of-way are shown in Table 9.4-5, *Road Relocation Floodplain Impacts*.
[a] Includes frequent, occasional, and rare flooded NRCS-mapped soils
[b] Includes all proposed rail line crossings of surface waters within the right-of-way.
Source: Federal Emergency Management Agency 1981, 1997, 2010; Natural Resources Conservation Service Undated
FEMA = Federal Emergency Management Agency; NRCS = Natural Resources Conservation Service

Table 9.4-5. Road Relocation Floodplain Impacts Outside the Right-of-Way

Build Alternative	Length within FEMA-Mapped 100-year Floodplain (linear feet)	Area within FEMA-Mapped 100-Year Floodplain (acres)	Area within NRCS Floodplains (acres)[a]	Number of Surface Water Crossings[b]
Tongue River	0	0	0.63	25
Tongue River East	0	0	0.31	19
Colstrip	425	0.23	0.44	27
Colstrip East	425	0.23	0.12	21
Tongue River Road	0	0	1.21	17
Tongue River Road East	0	0	0.90	11
Moon Creek	0	0	0.64	31
Moon Creek East	0	0	0.32	25
Decker	0	0	0	16
Decker East	0	0	0	15

Notes:
Road relocation floodplain impacts include only those outside of the right-of-way. Impacts within the right-of-way are shown in Table 9.4-4.
[a] Includes frequent, occasional, and rare flooded NRCS-mapped soils
[b] Includes all road relocation surface water crossings both within and outside of the right-of-way
Source: Federal Emergency Management Agency 1981, 1997, 2010; Natural Resources Conservation Service Undated
FEMA = Federal Emergency Management Agency; NRCS = Natural Resources Conservation Service

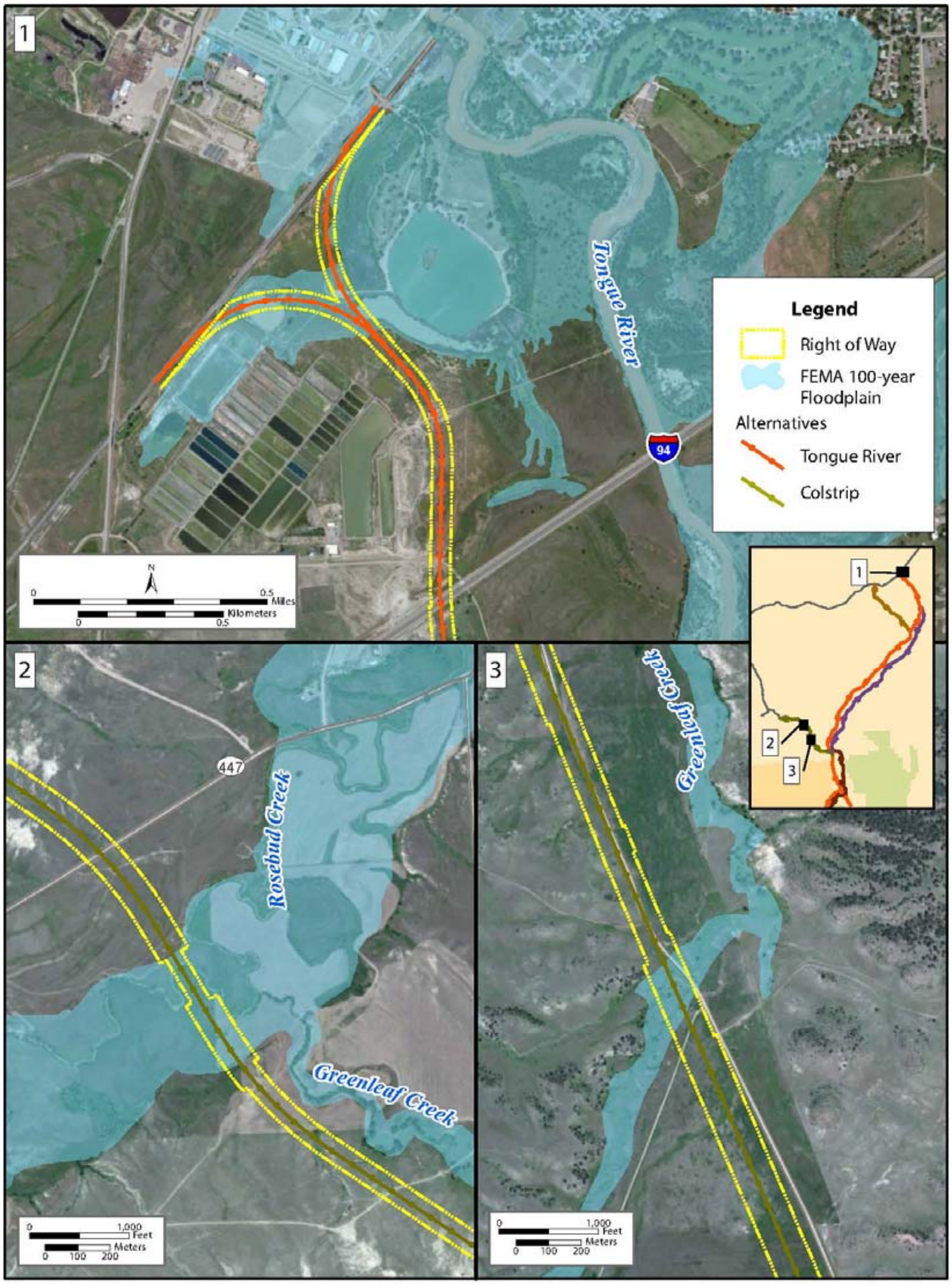


Figure 9.4-1a. FEMA Floodplains

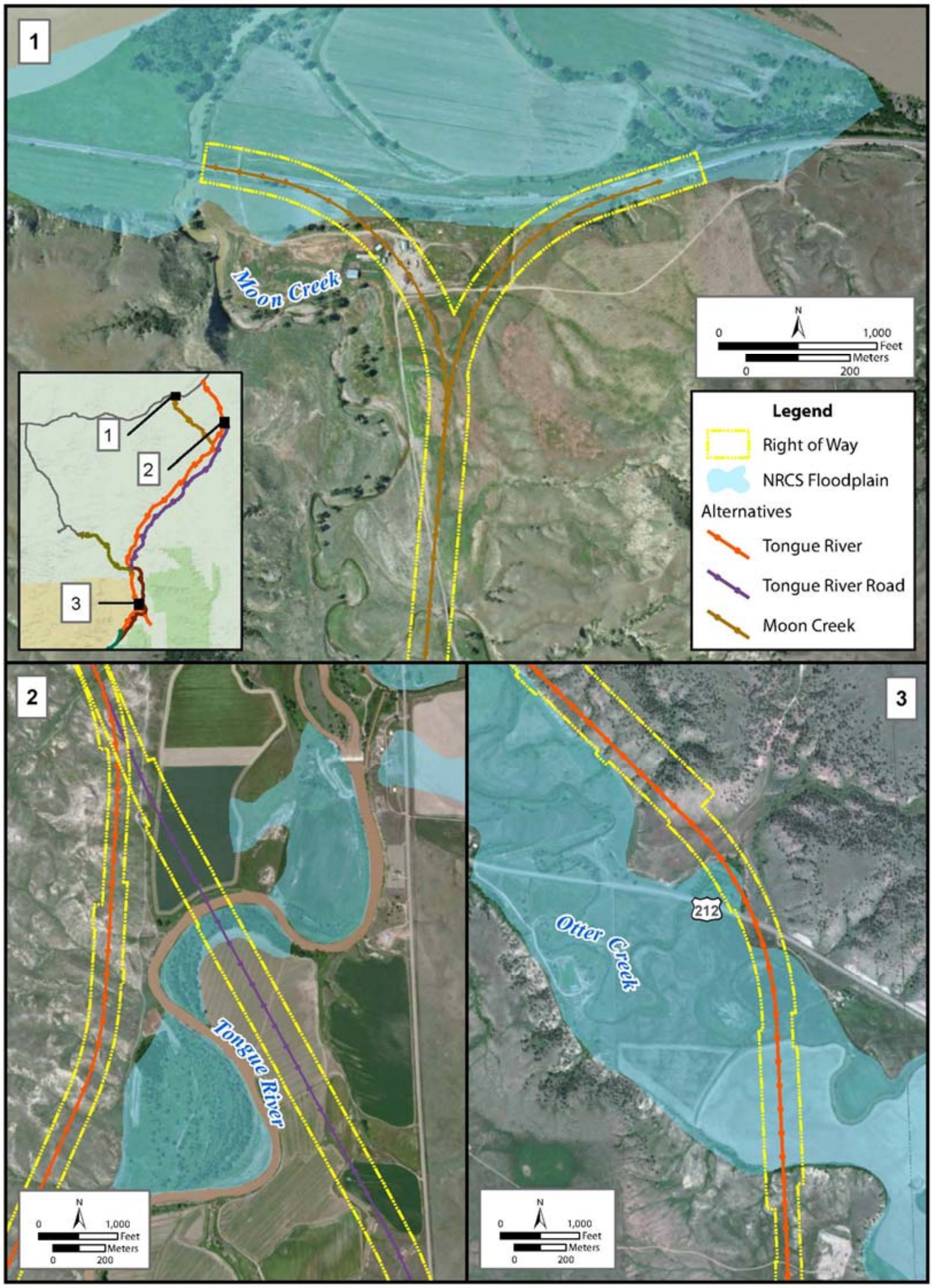


Fig 9.4-1b. NRCS Floodplains

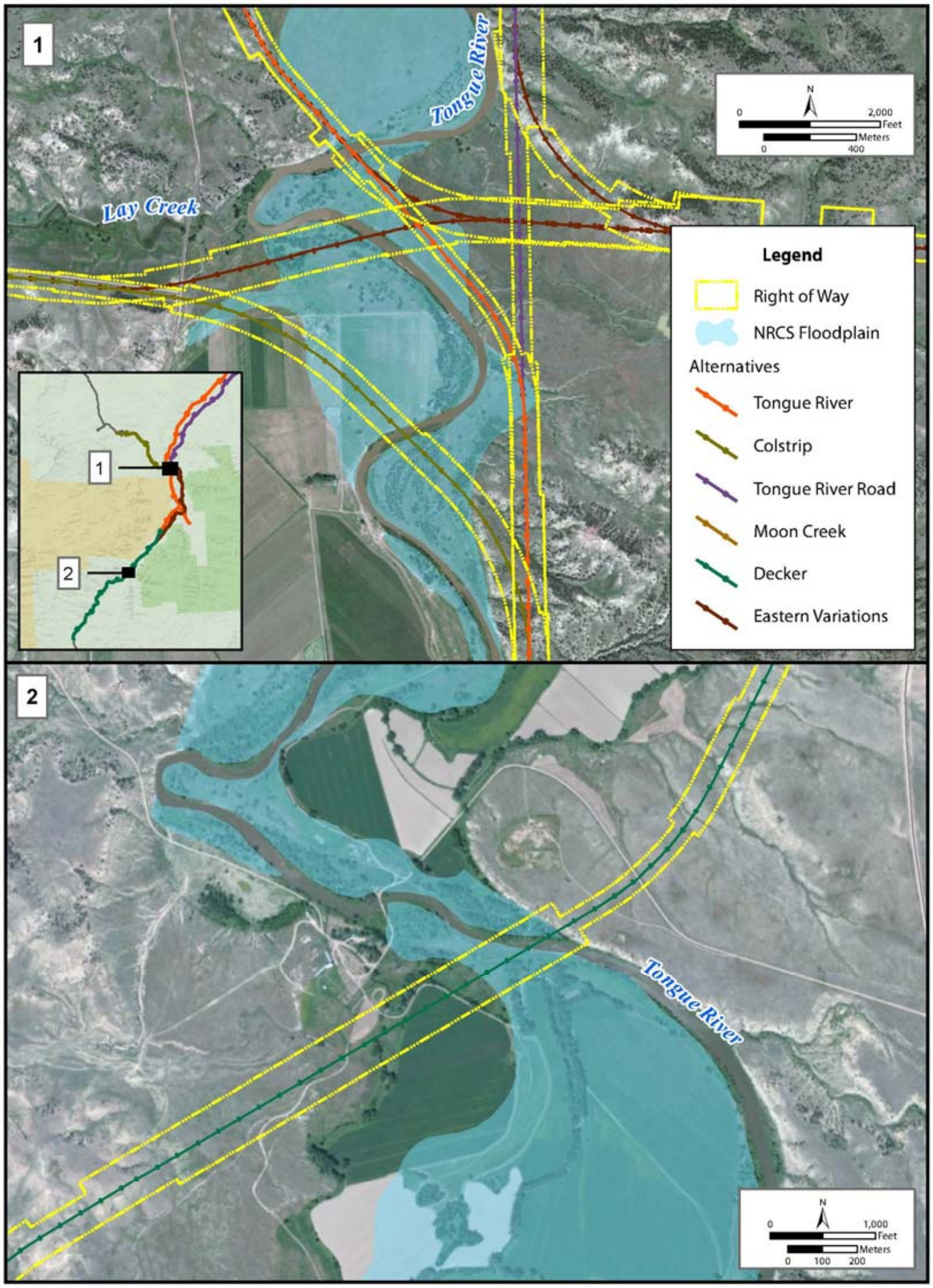


Fig 9.4-1c. NRCS Floodplains

Tongue River Alternatives

Tongue River Alternative

The Tongue River Alternative would cross 3,640 linear feet of FEMA-mapped 100-year floodplain where it parallels the west side of the Tongue River at the northern terminus in Miles City. Approximately 14 acres of this floodplain are mapped within the right-of-way, and 112 acres of NRCS-mapped soils that may experience frequent, occasional, or rare flooding are mapped in the right-of-way. A total of 145 surface waters would be crossed by this build alternative (Table 9.4-4).

FEMA-mapped floodplains would not be affected by road relocations. Approximately 0.63 acre of NRCS-mapped soil that may experience flooding is mapped within road relocations. A total of 25 surface waters would be crossed by road relocations associated with the Tongue River Alternative (Table 9.4-5).

Tongue River East Alternative

The Tongue River East Alternative would result in the same impacts regarding FEMA-mapped floodplains as those described for the Tongue River Alternative. Approximately 64 acres of NRCS-mapped soils that may experience frequent, occasional, or rare flooding are mapped in the right-of-way. A total of 167 surface waters would be crossed by this build alternative (Table 9.4-4).

FEMA-mapped floodplains would not be affected by road relocations. Approximately 0.31 acre of NRCS-mapped soil that may experience flooding is mapped within road relocations. A total of 19 surface waters would be crossed by road relocations associated with the Tongue River East Alternative (Table 9.4-5).

Colstrip Alternatives

Colstrip Alternative

The Colstrip Alternative would cross 625 linear feet of FEMA-mapped 100-year floodplain at the Greenleaf Creek crossing and 1,280 linear feet of FEMA-mapped 100-year floodplain at the Rosebud Creek crossing (totaling 1,905 linear feet). Approximately 3.33 acres of the Greenleaf Creek FEMA floodplain and 9.61 acres of the Rosebud Creek FEMA floodplain are mapped within the right-of-way (totaling 12.94 acres). Approximately 88 acres of NRCS-mapped soils that may experience frequent, occasional, or rare flooding are mapped in the right-of-way. A total of 62 surface waters would be crossed by this build alternative (Table 9.4-4).

Road relocations would affect 0.23 acre (425 linear feet) of FEMA-mapped 100-year floodplain (associated with Greenleaf Creek) and 0.44 acre of NRCS-mapped soil that may experience flooding. A total of 27 surface waters would be crossed by road relocations associated with the Colstrip Alternative (Table 9.4-5).

Colstrip East Alternative

The Colstrip East Alternative would result in the same impacts regarding FEMA-mapped floodplains as those described for the Colstrip Alternative. Approximately 42 acres of NRCS-mapped soils that could experience frequent, occasional, or rare flooding are mapped in the right-of-way. A total of 82 surface waters would be crossed by this build alternative (Table 9.4-4).

Road relocations would affect 0.23 acre (425 linear feet) of FEMA-mapped 100-year floodplain (associated with Greenleaf Creek) and 0.12 acre of NRCS-mapped soils that may experience flooding. A total of 21 surface waters would be crossed by road relocations associated with the Colstrip East Alternative (Table 9.4-5).

Tongue River Road Alternatives

Tongue River Road Alternative

The Tongue River Road Alternative would cross 3,640 linear feet of FEMA-mapped 100-year floodplain where it parallels the west side of the Tongue River at the northern terminus in Miles City. Approximately 14 acres of this floodplain are mapped within the right-of-way, and 113 acres of NRCS-mapped soils that could experience frequent, occasional, or rare flooding are mapped in the right-of-way. A total of 169 surface waters would be crossed by this build alternative (Table 9.4-4).

FEMA-mapped floodplains would not be affected by road relocations. Approximately 1.21 acres of NRCS-mapped soil that may experience flooding are mapped within road relocations. A total of 17 surface waters would be crossed by road relocations associated with the Tongue River Road Alternative (Table 9.4-5).

Tongue River Road East Alternative

The Tongue River Road East Alternative would result in the same impacts regarding FEMA-mapped floodplains as those described for the Tongue River Road Alternative. Approximately 65 acres of NRCS-mapped soils that could experience frequent, occasional, or rare flooding are mapped in the right-of-way. A total of 189 surface waters would be crossed by this build alternative (Table 9.4-4).

FEMA-mapped floodplains would not be affected by road relocations. Approximately 0.9 acre of NRCS-mapped soil that may experience flooding is mapped within road relocations. A total of 11 surface waters would be crossed by road relocations associated with the Tongue River Road East Alternative (Table 9.4-5).

Moon Creek Alternatives

Moon Creek Alternative

The Moon Creek Alternative would not cross any FEMA-mapped 100-year floodplains. Approximately 105 acres of NRCS-mapped soils that could experience frequent, occasional, or rare flooding are mapped in the right-of-way. A total of 157 surface waters would be crossed by this build alternative (Table 9.4-4).

FEMA-mapped floodplains would not be affected by road relocations. Approximately 0.64 acre of NRCS-mapped soil that may experience flooding is mapped within road relocations. A total of 31 surface waters would be crossed by road relocations associated with the Moon Creek Alternative (Table 9.4-5).

Moon Creek East Alternative

The Moon Creek East Alternative would not cross any FEMA-mapped 100-year floodplains. Approximately 57 acres of NRCS-mapped soils that could experience frequent, occasional, or rare flooding are mapped in the right-of-way. A total of 179 surface waters would be crossed by this build alternative (Table 9.4-4).

FEMA-mapped floodplains would not be affected by road relocations. Approximately 0.32 acre of NRCS-mapped soil that may experience flooding is mapped within road relocations. A total of 25 surface waters would be crossed by road relocations associated with the Moon Creek East Alternative (Table 9.4-5).

Decker Alternatives

Decker Alternative

The Decker Alternative would not cross any FEMA-mapped 100-year floodplains. Approximately 13 acres of NRCS-mapped soils that could experience frequent, occasional, or rare flooding are mapped in the right-of-way. A total of 113 surface waters would be crossed by this build alternative (Table 9.4-4).

FEMA-mapped floodplains and NRCS mapped soils that may experience flooding would not be affected by road relocations. A total of 16 surface waters would be crossed by road relocations associated with the Decker Alternative (Table 9.4-5).

Decker East Alternative

The Decker East Alternative would not cross any FEMA-mapped 100-year floodplains. Approximately 9 acres of NRCS-mapped soils that could experience frequent or occasional flooding are mapped in the right-of-way. A total of 113 surface waters would be crossed by this build alternative (Table 9.4-4).

FEMA-mapped floodplains and NRCS mapped soils that may experience flooding would not be affected by road relocations. A total of 15 surface waters would be crossed by road relocations associated with the Decker East Alternative (Table 9.4-5).

9.4.4.3 No-Action Alternative

Under the No-Action Alternative, TRRC would not construct and operate the proposed Tongue River Railroad, and there would be no impacts on floodplains from construction or operation of the proposed rail line.

9.4.4.4 Mitigation and Unavoidable Environmental Consequences

To avoid or minimize the environmental impacts on floodplains from construction and operation of the proposed rail line, OEA is recommending that the Board impose six mitigation measures, including two measures volunteered by TRRC (Chapter 19, Section 19.2.6, *Water Resources*). These measures would require TRRC to install drainage structures to prevent flow restrictions, coordinate stream crossings with floodplain administrators, prepare a final bridge design analysis, clear debris from culverts and bridges, design and construct the rail line to maintain flow and drainage patterns, and design the alignment to avoid floodplains of perennial streams and cross them at a perpendicular angle, when possible.

Even with the implementation of OEA's recommended mitigation measures and TRRC's voluntary measures, construction and operation of the proposed rail line would cause unavoidable impacts on floodplains. These impacts would include decreased floodplain storage capacity, diversion of flood flows by fill placement, constriction of flood flows at bridge and culvert locations, decreased floodplain water retention, and altered flood dynamics from the presence of rail infrastructure. OEA concludes that these adverse impacts would be minor.

9.5 Wetlands

This section describes the impacts on *wetlands*[1] that would result from construction and operation of each of the build alternatives. Wetlands are lands where water saturation determines the nature of soil and the types of plant and animal communities living in that soil and on its surface (Cowardin et al. 1979). The subsections that follow describe the wetland study area, methods used to analyze wetland impacts, affected environment, and the impacts of the build alternatives on wetlands. The regulations and guidance related to wetlands are summarized in Section 9.6, *Applicable Regulations*. Appendix M, *Wetland Resources and Assessments*, provides further data on methods and wetland metrics. The contribution of the proposed rail line to cumulative impacts on wetlands is discussed in Chapter 18, *Cumulative Impacts*.

In summary, OEA identified seven wetland types totaling 387 acres in the study area. The functional capacity of most wetlands ranges from low to moderate, but some higher-functioning wetlands are present and are mostly associated with the Tongue River. OEA did not identify any unique wetlands. Construction would affect the most wetland acres along the Tongue River Road East Alternative and the fewest wetland acres along the Colstrip Alternative. Construction of the Colstrip East Alternative would affect the most acres of higher-functioning wetlands while construction of the Colstrip Alternative would affect the fewest acres of higher-functioning wetlands. OEA concludes that filling these wetlands would be an adverse impact.

9.5.1 Study Area

OEA defined the wetland study area as the right-of-way for each build alternative plus 400 feet of buffer on either side of the right-of-way. The wetland study area is 34,858 acres. The purpose of the buffer is to account for impacts on wetlands that are outside of the right-of-way. These wetlands are adjacent to but not in the right-of-way, and are described as *adjacent to the right-of-way* throughout this section. These wetlands may touch the right-of-way edge or they may be near the edge, but they are all outside of the right-of-way, within the 400-foot buffer, and in the wetland study area. The study area also includes the few areas where the proposed road relocations would extend.

9.5.2 Analysis Methods

OEA used the following methods to evaluate the impacts of construction and operation of the build alternatives on wetlands. See Appendix M, *Wetland Resources and Assessments*, for a more detailed description of the wetland determination methods.

[1] Terms italicized at first use are defined in Chapter 25, *Glossary*.

9.5.2.1 Wetland Identification

OEA and USACE discussed the wetland determination methods on January 16, 2013 and May 9, 2013. During the first teleconference, OEA and USACE agreed that a reconnaissance-level determination based on the technical guidance in the USACE wetland delineation manual would be appropriate for the Board's National Environmental Policy Act (NEPA) analysis. Should the Board decide to license one of the build alternatives and should TRRC decide to construct the proposed rail line, detailed delineations would be conducted for the licensed build alternative during the Section 404 Clean Water Act permitting process (prior to construction). During the May 2013 teleconference, OEA and USACE discussed the details of the reconnaissance-level determination method to ensure a sufficient level of information for this EIS would be collected in the field. OEA and USACE determined that three steps would be taken to establish baseline conditions for the wetlands identification analysis.

- Preliminary mapping based on existing information including the Montana Natural Heritage Program's Wetland and Riparian Framework, U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory, the U.S. Geological Survey's National Hydrography Dataset, and multiple color aerial photos from the U.S. Department of Agriculture Farm Service Agency's National Agriculture Imagery Program.
- Reconnaissance-level field determination based on the technical guidance provided in the USACE wetland delineation manual for routine wetland determinations. The manual stresses the need for considering the following three parameters that establish wetland conditions.
    - Hydrophytic vegetation
    - Hydric soils
    - Hydrology

  The reconnaissance-level field determination considered and collected information on two of the three parameters: hydrophytic vegetation and hydrology. Areas that exhibited positive evidence of these two parameters, as defined by the manual, were determined to be wetland. The third parameter, hydric soils, was considered during the preliminary mapping phase using U.S. Department of Agriculture soil survey information. The reconnaissance-level field determination method discussed with USACE included the option for soil sampling in questionable wetland areas (i.e., borderline hydrophytic vegetation). However, OEA took a more conservative approach and included the areas as a wetland. OEA found very few questionable areas and determined that most wetlands were positive for hydrophytic vegetation and hydrology indicators, as defined by the manual; therefore, the existence of underlying hydric soils was assumed. The delineation manual allows for the assumption of hydric soils under certain conditions, under which soil digging or sampling is not required. These conditions were present throughout the wetland study area, and hydric soil conditions were technically established for these wetlands under the guidelines of the USACE delineation manual without the need for digging or sampling soil.

- Final mapping, as supported by the field data. Final mapping resulted in a geographic information system (GIS) data layer of all wetlands mapped in the study area. Associated with the GIS data layer are various field data for each wetland mapped.

OEA conducted fieldwork only where OEA was able to obtain land access permission from landowners. OEA put substantial effort into obtaining access to lands along the right-of-way of each build alternative (Appendix B, *Land Access*). Although the wetlands study area was 34,858 acres, OEA was permitted access to only 12,820 acres (37 percent) of the study area.

Of these 12,820 acres (37 percent of the study area with permitted access), OEA actually surveyed 9,207 acres (72 percent of the acres with permitted access). OEA did not access 3,613 acres (28 percent of the acres with permitted access) for the following reasons.

- Isolated parcels were surrounded by inaccessible parcels with no public roads for access (1,259 acres or 10 percent of permitted access area).
- Parcels were inaccessible due to an active coal seam fire (645 acres or 5 percent of permitted access area).
- A sufficient representative sample had been collected per the prescribed wetland assessment method (described below) and there was no need to access these areas to collect additional data (1,709 acres or 13 percent of permitted access area).

For these 3,613 acres, OEA relied on the preliminary mapping phase and used field results from surveyed wetlands to infer potential wetlands in the study area where ground reconnaissance surveys were not conducted.

Prescribed Wetland Assessment Method

The method discussed with USACE assumed that OEA would visit a much lower percentage of accessible areas to collect data on a representative sample of wetlands, with the intent of applying this information to map all other wetland and surface water areas. A representative sample is a subset of wetlands that accurately reflects the type and quality of wetlands in the entire study area. A representative sample approach was proposed because of the immense size of the wetland study area (34,858 acres), the uncertainty (at the time) of land access, and the amount of time it would take to conduct fieldwork should OEA obtain access to 100 percent of the study area. As it became clear that land access would be restricted to only 37 percent of the wetland study area, OEA determined that it could go beyond the representative sample approach and conduct fieldwork on a larger sample of accessible lands to collect as much wetland data as possible. OEA used the data collected from this large representative sample to map wetlands in the remaining wetland study area where ground reconnaissance surveys were not conducted (Appendix M, *Wetland Resources and Assessments*).

9.5.2.2 Wetland Classifications and Functions

OEA used the Cowardin (1979) system to classify wetlands in the study area. Biologists used the Montana Department of Transportation's Montana Wetland Assessment Method (Berglund and McEldowney 2008) to assess the wetland functions in the study area. The application of these methods is discussed further in Section 9.5.3, *Affected Environment*, and in Appendix M, *Wetland Resources and Assessments.*

9.5.2.3 Impact Determination

OEA assumed that the entire right-of-way would be disturbed during rail construction from clearing, excavation, and placement of fill material, where the placement of fill material in wetlands would cause a permanent loss of wetland area. Some areas would be permanently disturbed (e.g., in the rail line footprint) and some areas would be temporarily disturbed. It is unlikely the entire right-of-way would be disturbed during construction, but the exact locations of permanent and temporary disturbance within the right-of-way are unknown at this time and would be determined during final engineering and design. Therefore, OEA's assumption that the entire right-of-way would be disturbed is likely to over-estimate the actual impacts. OEA overlaid the right-of-way GIS data layer and the GIS wetland data layer in a GIS model to calculate the acres of wetland impacts in the right-of-way for each build alternative. OEA also overlaid the preliminary road relocation GIS data layer and the GIS wetland data layer to calculate the acres of wetland impacts associated with the road relocations. Biologists also collected wetland functional assessment data about the quality of wetlands that would be affected by construction and operation of each build alternative. In consultation with USACE (Tillinger pers. comm.) and the USFWS Montana Office (Berglund pers. comm.), OEA determined that the appropriate wetland functional assessment method was the Montana Department of Transportation's Montana Wetland Assessment Method (Berglund and McEldowney 2008) because this method is specifically designed for long, linear projects in Montana.

OEA assessed the impacts on wetlands adjacent to the right-of-way qualitatively because no rail construction would occur outside of the right-of-way. With the exception of road relocations, wetlands adjacent to the right-of-way would not be filled, cleared, excavated, or touched in any other way during project construction. Some wetlands may extend across the right-of-way boundary, existing within both the right-of-way and adjacent to the right-of-way. While there would be no rail construction in wetlands adjacent to the right-of-way, impacts from construction and operation within the right-of-way could extend to these wetlands. However, it was not possible to determine the extent of, or to quantify, the potential impact on these adjacent wetlands because there is no way to predict exactly how a particular wetland adjacent to the right-of-way would react to rail construction or operation in the right-of-way itself.

9.5.3 Affected Environment

Under the U.S. Environmental Protection Agency (USEPA) and U.S. Army Corps of Engineers (USACE) Clean Water Act regulations, wetlands are defined as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (40 Code of Federal Regulations [C.F.R.] § 230.3(t); 33 C.F.R. § 328.3(b)).

Wetlands in the study area were identified based on the USEPA and USACE wetland definitions. Wetlands may or may not be considered jurisdictional (known as waters of the United States) under the Clean Water Act, but under NEPA, all wetlands must be addressed regardless of their jurisdictional status under the Clean Water Act because nonjurisdictional wetlands are still part of the “human environment.”

9.5.3.1 Wetland Classification

OEA classified wetlands in the study area using the Cowardin et al. (1979) system, which was developed for USFWS to classify wetlands and deep-water habitats. The Cowardin classification systems covers all wetlands and deep-water habitats, including wetlands, streams, and other nonwetland surface waters (e.g., ponds and lakes); therefore, all wetlands and surface waters are collectively described and included in this analysis. Using this system, OEA identified seven basic wetland types in the study area, as described below. (The unique terms of wetland morphology, hydrology, and topography are defined in detail in Appendix M, *Wetland Resources and Assessments.* Chapter 25, *Glossary*, also contains definitions of key terms.)

- ***Palustrine emergent* (PEM).** These wetlands typically occur in the floodplains of larger rivers and streams (e.g., Tongue River, Moon Creek), in old oxbows and meander scars, in ephemeral swales, and below the earthen impoundments of reservoirs and stock ponds. Such areas include wetlands in the *hydrogeomorphic (HGM) classes*[2] of depressional, slope, and slope/mineral flats. Typical vegetation, as observed in the field, includes pale spikerush (*Eleocharis palustris*), Kentucky bluegrass (*Poa pratensis*), fowl bluegrass (*Poa palustris*), Baltic rush (*Juncus balticus*), various sedges (*Carex* spp.), common three-square bulrush (*Schoenoplectus pungens*), foxtail barley (*Hordeum jubatum*), common cocklebur (*Xanthium strumarium*), prairie cordgrass (*Spartina pectinata*), and cattail (*Typha latifolia*). These wetlands are typically flooded temporarily to seasonally.
- ***Palustrine scrub-shrub* (PSS).** OEA did not encounter these wetlands during the field determination phase, but identified them on a few restricted land parcels (parcels where OEA was denied access by the landowner) during preliminary wetland mapping. This wetland type is typically associated with the banks and floodplain of the Tongue River

[2] The HGM classification is a system of classifying wetlands based on their landscape position (geomorphic setting), water source, and the way in which water moves through them (hydrodynamics) (Smith et al. 1995).

and is likely dominated by trees such as sandbar willow (*Salix exigua*) and other willow species, young green ash (*Fraxinus pennsylvanica*), and eastern cottonwood (*Populus deltoides*) saplings. Understory vegetation likely includes various sedges (*Carex* spp.), smooth brome (*Bromus inermis*), Kentucky bluegrass, reed canarygrass (*Phalaris arundinacea*), and fowl bluegrass (Montana Natural Heritage Program 2013a). Snowberry (*Symphoricarpos albus*) may also be common. These wetlands are typically in the slope, slope/mineral flats, and riverine HGM classes. These wetlands are typically flooded temporarily to seasonally.

- ***Palustrine aquatic bed* (PAB).** These wetlands typically include the permanently to semipermanently flooded portions of artificially impounded stock ponds and reservoirs, and some old oxbows and meander scars of the larger streams (Tongue River, Moon Creek). These areas typically have water depths of more than 2 feet with shallower areas (e.g., palustrine unconsolidated bottom and palustrine unconsolidated shore wetlands) around their perimeters. They are typically sparsely vegetated with aquatic vegetation. Although such vegetation was not observed during the field surveys, Montana Natural Heritage Program reports that species of waterweed (*Elodea* spp.), water milfoil (*Myriophyllum* spp.), bladderworts (*Utricularia* spp.), pondweeds (*Potamogeton* spp.) and Mare's tail (*Hippuris vulgaris*) are typically common (Montana Natural Heritage Program 2013b). Wetlands of this type would fall into the depressional HGM class.
- ***Palustrine unconsolidated bottom* (PUB)*/unconsolidated shore* (PUS).** Wetlands of this type are typically found around the edges of artificially impounded stock ponds and reservoirs and in shallow, sparsely vegetated depressions where waters depths are typically less than 2 feet. Hydrologic regimes in such areas include semipermanently flooded, temporarily flooded, artificially flooded, and intermittently exposed regimes. The difference between PUB and PUS wetlands is primarily the substrate, but OEA did not distinguish differences in substrate type because examination of soil and substrates of deeper waters was not part of the reconnaissance-level field determination methodology. Therefore, PUB and PUS wetlands are combined and identified as palustrine in this analysis. Typical vegetation in such areas includes pale spikerush, dock-leaf smartweed (*Polygonum lapathifolium*), cattail, sedges (*Carex* spp.), common three-square bulrush, Kentucky bluegrass, common cocklebur, peppergrass (*Lepidium* sp.), and dock (*Rumex* sp.). Wetlands of this type are typically in the depressional, slope, and slope/mineral flats HGM classes. Scattered shrubs and trees such as willow (*Salix* sp.), Russian olive (*Elaeagnus angustifolia*), and eastern cottonwood occur adjacent to these wetland types.
- ***Riverine* (R)–unvegetated.** This wetland type includes intermittent and ephemeral drainages that lack vegetation within their channels. They are typically located on the slopes above valley floors, with established channels from 1 to 6 feet in width. Substrate is a combination of bedrock, boulders, sand, and gravel. Hydrologic regime is temporary/ephemeral to seasonal/intermittent. Surrounding vegetation typically includes Kentucky bluegrass, cheatgrass (*Bromus tectorum*), smooth brome, silver sagebrush (*Artemisia cana*), big sagebrush (*Artemisia tridentata*), and common snowberry.

Ponderosa pine (*Picea ponderosa*) occurs in adjacent areas in the southern portions of the study area, and scattered green ash and eastern cottonwood occur along such channels at lower elevations near the Tongue River. These types of wetlands are in the riverine HGM class. Many of these drainages flow into artificially created reservoirs and stock ponds formed by artificial impoundments.

- **Riverine (R)–vegetated.** This wetland type occurs in ephemeral, intermittent, and perennial stream channels in areas where the gradient is relatively flat to gently sloping and includes wetlands in the riverine HGM class. Channels typically range from 3 to 20 feet in width, with some (Tongue River) extending over 100 feet in width. Substrates are typically dominated by mud, sand, gravel, and some cobble. Hydrologic regimes typically include temporary/ephemeral, seasonal/intermittent, and permanent/perennial. In-stream vegetation is primarily emergent and includes such species as Kentucky bluegrass, fowl bluegrass, pale spikerush, common three-square bulrush, foxtail barley, and dock-leaf smartweed. Small patches of cattails and reed canarygrass are also present in wetter locations, and common cocklebur is occasionally present in seasonally exposed areas. Common plants found adjacent to these channels include green ash, eastern cottonwood, ponderosa pine, Rocky Mountain juniper (*Juniperus scopulorum*), common snowberry, willow (*Salix* spp.), wood rose (*Rosa woodsii*) silver sagebrush, and big sagebrush. Adjacent herbaceous vegetation commonly includes cheatgrass, western wheatgrass (*Pascopyrum smithii*), crested wheatgrass (*Agropyron cristatum*), peppergrass (*Lepidium* sp.), and smooth brome.
- ***Lacustrine* (L).** Lacustrine wetlands in the study area are limited to Spotted Eagle Lake (northern end of the study area in Miles City) and Tongue River Reservoir (southern end of the study area). These areas are large, permanently inundated bodies of waters that support a varying degree of fringe wetlands commonly dominated by such species as cattail, bulrushes (*Schoenoplectus* spp.), spikerush (*Eleocharis* sp.), willow (*Salix* spp.), eastern cottonwood, and green ash. Wetlands of this type are in the lacustrine fringe HGM class.

Approximately 387 acres of the study area (1.1 percent) are wetlands, mostly riverine and emergent types (Figures 9.5-1a to 9.5-1d and Table 9.5-1).

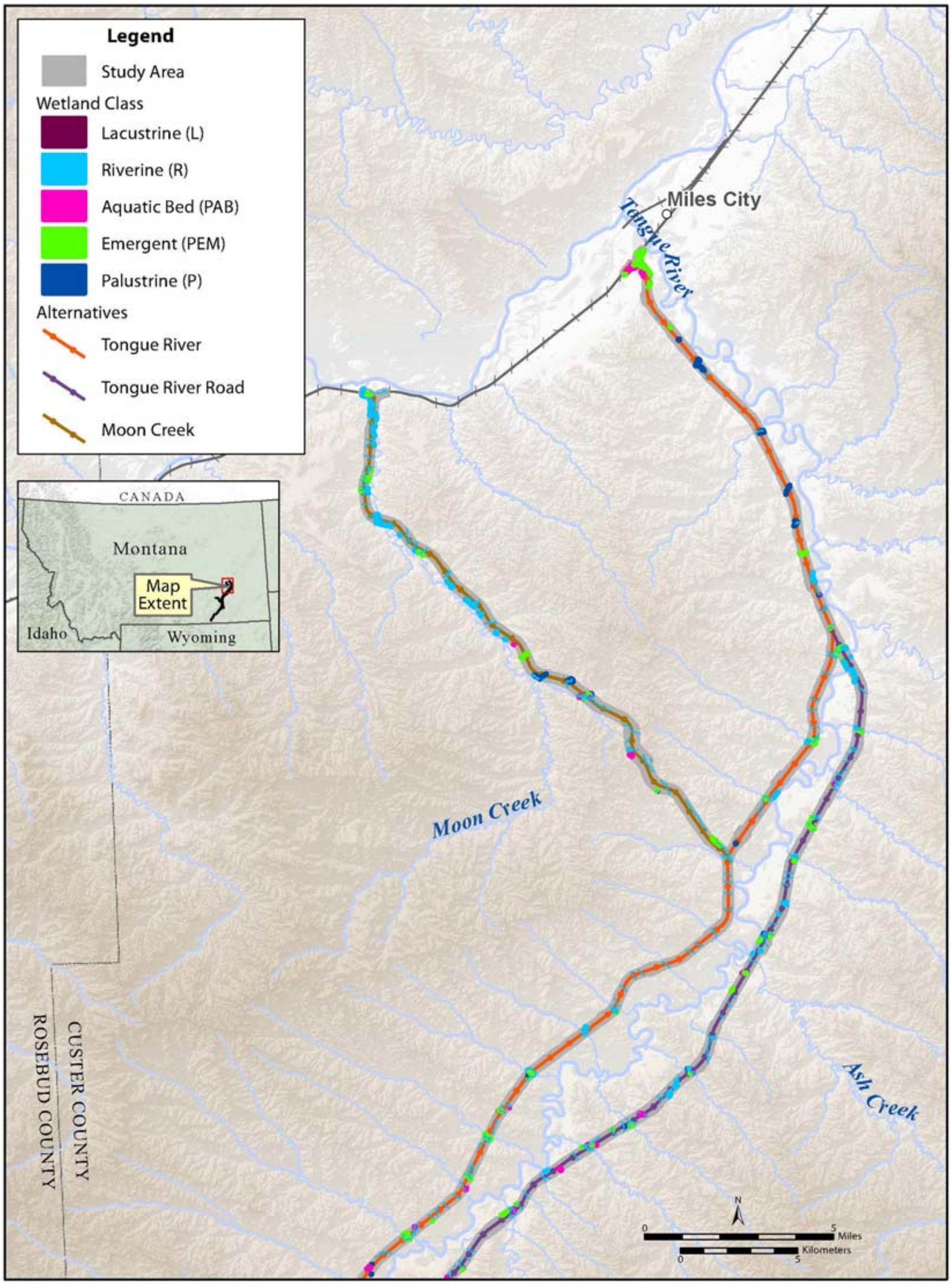


Figure 9.5-1a. Wetlands in the Study Area

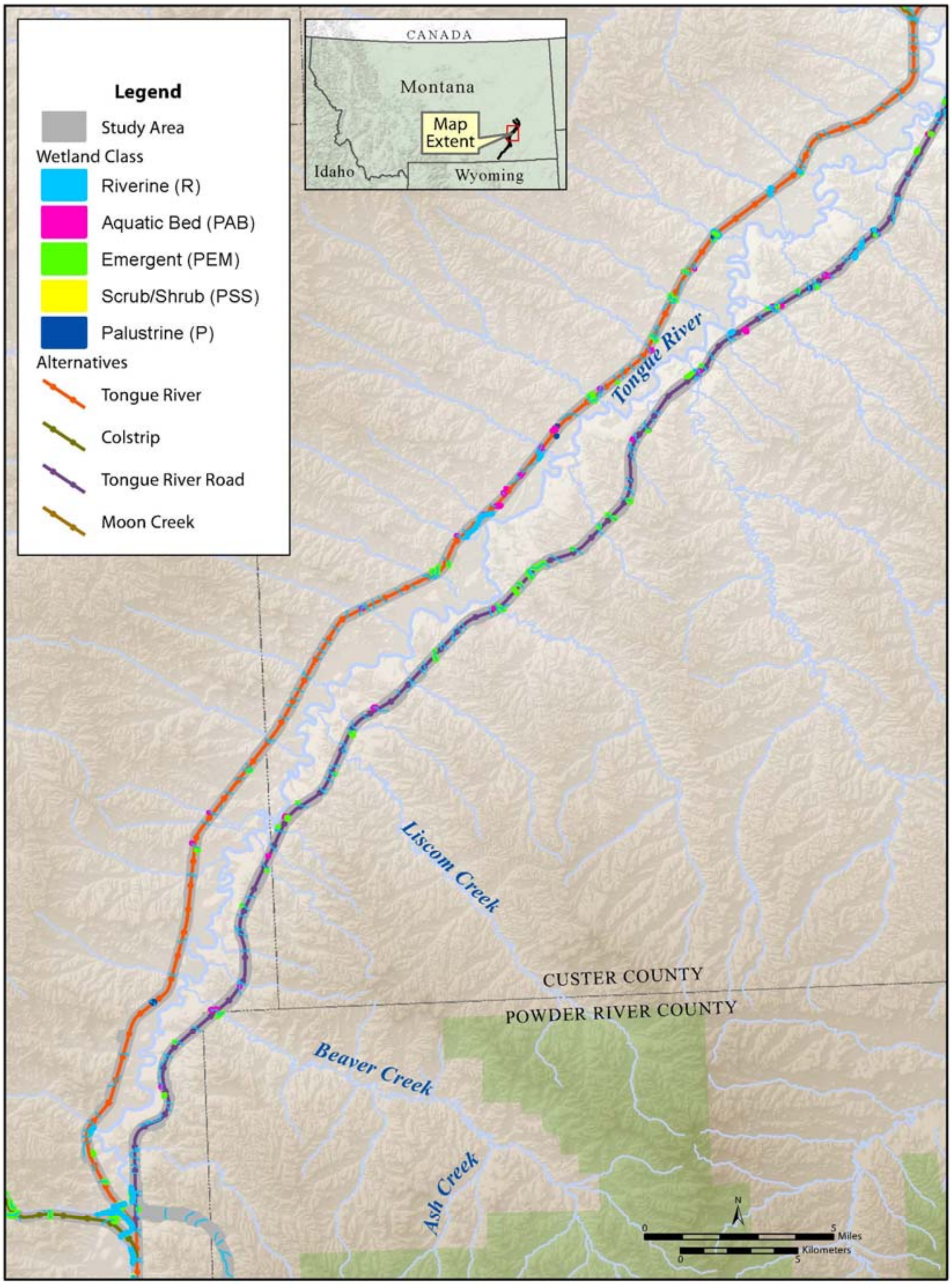


Figure 9.5-1b. Wetlands in the Study Area

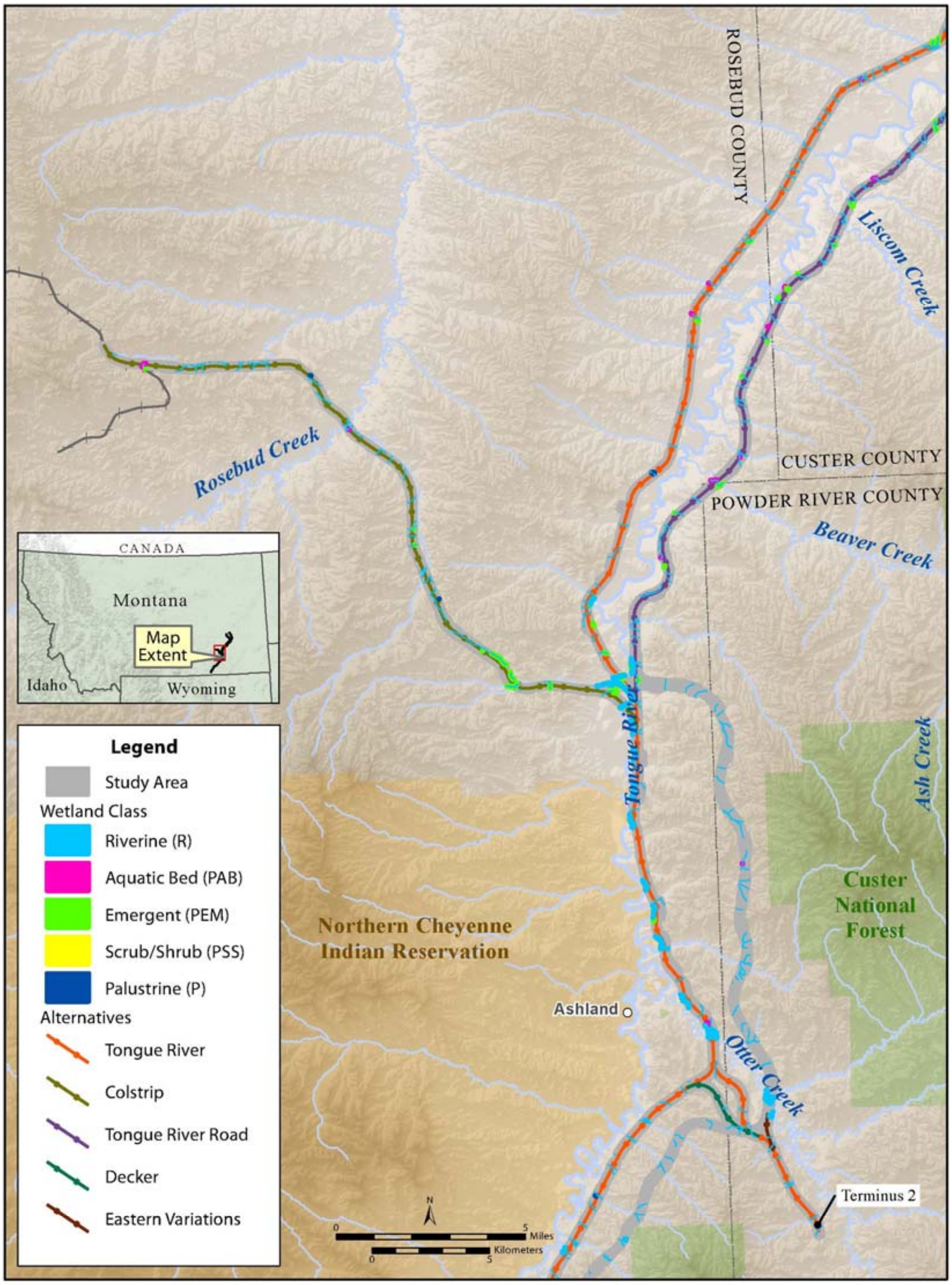


Figure 9.5-1c. Wetlands in the Study Area

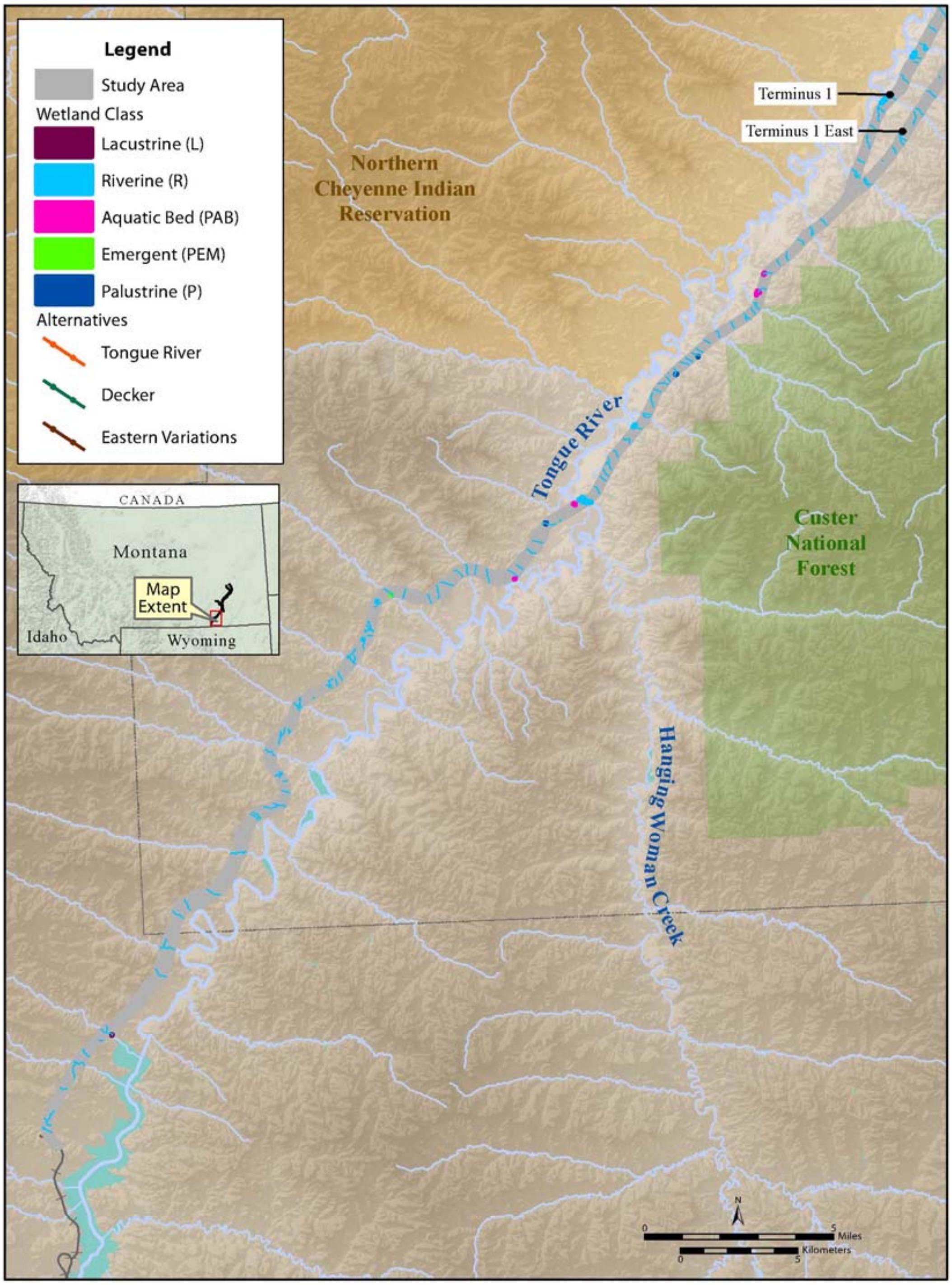


Figure 9.5-1d. Wetlands in the Study Area

Table 9.5-1. Wetland Types in the Study Area

Wetland Type	Proportion of Wetlands in the Study Area (percent)[c]	Wetland Area (acres)
Palustrine emergent (PEM)	27.3	105.8
Palustrine scrub-shrub (PSS)	2.2	8.5
Palustrine aquatic bed (PAB)	9.0	34.8
Palustrine (P)[a]	4.7	18.2
Riverine[b] (R)	56.6	219.2
Lacustrine (L)	0.1	0.5
Total	**100**	**387.0**

Notes:
[a] Palustrine (P) wetland type consists of palustrine unconsolidated bottom (PUB) and palustrine unconsolidated shore (PUS). Due to the reconnaissance level of the field determination, the differences in substrate type were not distinguished, and the wetland types are combined and identified as P
[b] Riverine (R) wetland type includes both vegetated and unvegetated wetland
[c] Total does not equal sum of values due to rounding

9.5.3.2 Wetland Functions and Values

Wetland functions are self-sustaining properties of a wetland ecosystem that exist in the absence of society, and relate to the ecological significance of the wetland without regard for subjective human values. Wetlands can have a number of benefits, including mitigating floods, improving water quality, recharging groundwater, and providing habitat for wildlife, depending on the location of the wetland and its physical characteristics. For example, a particular wetland might be considered valuable because it is known to store floodwaters adjacent to a developed area; that function is valuable to society because it attenuates floodwaters, which lessens the destructive severity of flood events (U.S. Army Corps of Engineers 1999).

OEA used the Montana Department of Transportation's Montana Wetland Assessment Method (Berglund and McEldowney 2008) to assess wetland functions and values in the study area. Up to 12 wetland functions and values can be assessed under the method, with all 12 generally falling into three broad functional areas: wildlife/fish habitat, water quality, and flood attenuation/stormwater retention. Based on the method's scoring system, the functional assessment categorizes wetlands into one of four categories.

- **Category I:** These wetlands of exceptionally high quality are generally rare to uncommon in the state or are important from a regulatory standpoint. These wetlands must satisfy one of the following criteria.
    - Receive the maximum possible functional points for listed/proposed threatened or endangered species.
    - Receive the maximum possible functional points for uniqueness.
    - Receive the maximum possible functional points for flood attenuation where engineered features would be protected downstream.

  - Receive more than 80 percent of the possible maximum functional points of all functions considered.

- **Category II:** These wetlands are more common than Category I wetlands and provide habitat for sensitive plants or animals, function at very high levels for wildlife and fish habitat, are unique in a given region, or are assigned high ratings for many of the assessed functions and values. These wetlands must satisfy one of the following criteria.
  - Receive the maximum possible functional points for Montana Natural Heritage Program Species Habitat.
  - Receive high functional points for general wildlife habitat.
  - Receive high functional points for general fish habitat.
  - Receive high functional points for uniqueness.
  - Receive more than 65 percent of the possible maximum functional points of all functions considered.
- **Category III:** These wetlands are more common and generally less diverse than Category I and II wetlands. If the criteria for Categories I, II, or IV wetlands are not satisfied, the wetland is, by default, Category III.
- **Category IV:** These wetlands are generally small and isolated, and lack vegetative diversity. These wetlands satisfy all of the following criteria.
  - Receive low rating for uniqueness.
  - Vegetated wetland component is less than 1 acre.
  - Receive less than 35 percent of the possible maximum functional points of all functions considered.

As shown in Table M-9 of Appendix M, *Wetland Resources and Assessments*, approximately 68 percent of the wetlands in the study area are Category III (45 percent) and Category IV (23 percent) wetlands. These wetlands exhibit a general lack of vegetative structural diversity, are located in active rangeland, provide limited fish and wildlife habitat, and have a predominant temporary or ephemeral hydrologic regime. Approximately 32 percent of wetlands in the wetlands study area are Category II wetlands; more than 99 percent of these Category II wetlands are in or adjacent to the Tongue River. These wetlands are Category II wetlands because of their association with a permanently flowing water body that supports vegetation that is more diverse, provides habitat for both fish and wildlife, and experiences overbank flooding. The two lacustrine wetlands (Spotted Eagle Lake at the northern end of the study area in Miles City) and Tongue River Reservoir (southern end of the study area) make up the remaining Category II wetlands (less than 1 percent) because of their structural diversity and higher-value wildlife habitat. There are no Category I wetlands in the study area.

OEA made the following general observations on wetland functions and values in the study area.

- Palustrine emergent wetlands are performing most functions at low to moderate levels, with the highest scores related to the support of wildlife/fish habitat and water quality.
- Palustrine aquatic bed and palustrine wetlands have low to moderate scores for most functions, with the highest scores related to long- and short-term water storage.
- Riverine-vegetated have moderate scores for most functions, with the highest scores related to flood attenuation and wildlife habitat.
- Riverine-unvegetated wetlands have low scores for all functions.

The application of the wetland functions and values assessment is discussed further in Appendix M, *Wetland Resources and Assessments*.

9.5.3.3 Unique Wetlands

The Montana Department of Transportation's Montana Wetland Assessment Method (Berglund and McEldowney 2008) describes unique wetlands in terms of their replacement potential and habitat diversity, relative abundance in a watershed, and degree of disturbance. These wetlands are typically high-functioning wetlands and would be rated as Category I wetlands (Section 9.5.3.2, *Wetland Functions and Values*). In Montana, five specific wetland types—fens, bogs, warm springs, mature (older than 80 years) forested wetlands, or wetlands plant associations listed as S1 by the Montana Natural Heritage Program (Chapter 8, Section 8.5, *Special-Status Species*, for definition of S1)—are considered unique. These wetlands are very difficult or impossible to replicate at mitigation sites. In the absence of these five specific wetlands types, a wetland's uniqueness depends on the rarity of the wetland in the watershed, level of structural diversity, and level of disturbance. In general, any wetland that is very low in abundance, completely undisturbed and intact, and extremely difficult to replace would be considered unique.

The wetland field determination and wetland functional assessment OEA conducted in the study area did not result in the identification of any fens, bogs, warm springs, mature forested wetlands, or any other wetland that would be considered extremely rare, completely undisturbed, or difficult to replace.

9.5.4 Environmental Consequences

Impacts on wetlands would result from construction and operation of any build alternative. The impacts common to all build alternatives are presented first, followed by impacts specific to the build alternatives.

Construction of the proposed rail line would require clearing, excavating, and filling of the right-of-way, which would result in the loss or alteration of wetland areas and result in affects to wetland water quality, flood and storage capacity, general habitat, and natural hydrologic functions. Similar wetland impacts would occur from road relocations. With the exception of road relocations, wetlands adjacent to the right-of-way would not be filled, cleared, or excavated, but construction and operation of a rail line adjacent to these wetlands could affect wetland hydrology, water quality, and vegetation and habitat characteristics. Any discharge of fill material in a wetland that is jurisdictional under Section 404 of the Clean Water Act would require compensatory mitigation to offset the impact and ensure there would be no net loss of wetland areas. Other sections of this Draft EIS address potential impacts on other resources that may be associated with wetlands, such as Section 8.3 *Wildlife*, Section 8.4 *Fish,* Section 8.5 *Special-Status Species*, and Section 9.2 *Surface Water*.

9.5.4.1 Impacts Common to All Build Alternatives

Construction

The following construction impacts are common to all build alternatives. Construction impacts would result in the permanent loss or alteration of certain wetlands and would affect wetland functions as described below. All impacts on wetlands from construction of the proposed rail line would be adverse, but the intensity would vary depending on the acreage and quality of the wetland that would be affected for each build alternative (Section 9.5.4.2, *Impacts by Build Alternativ*e).

- **Reduce Wetland Habitat**

  Fill material placed in wetlands would result in the permanent loss of wetland and associated vegetation communities, and any habitat that the wetland currently may provide for fish and wildlife. If a wetland were completely filled, these functions would be lost entirely. If a wetland is partially filled and fragmented or if wetland vegetation is trimmed or cleared, vegetation communities and habitat would be altered and degraded. Any fragmentation or interruption of wetland habitat and vegetation communities could affect wildlife use of the wetland area. Wetland habitat and vegetation communities could also be affected if the hydrology of the wetland system is altered by construction of the proposed railbed (or other project elements), which could result in wetland draining or ponding on either side of the rail or access road embankments. For example, if the railbed were built through the middle of a wetland, the interruption and fragmentation of the wetland's hydrology could result in the draining or ponding of water in the remaining wetland fragments on either side of the rail embankment. This hydrology alteration could affect vegetation and wetland habitat by changing plant species' composition (i.e., from wetland to upland plants if the wetland were to dry up over time). Depending on the extent of the wetland affected and the hydrologic regime of the wetland, this impact could extend outside of the right-of-way, which would alter wetland vegetation and habitat adjacent to the right-of-way.

During rail construction, fugitive dust from loose soil could be generated by heavy equipment operation. Any accumulation of fugitive dust on wetland vegetation could affect plant growth by inhibiting photosynthesis, which could result in reduced vegetation density and plant diversity. This could also allow invasive plant species to take hold and colonize wetland areas, which could reduce plant species' richness.

- **Compromise Water Quality Function and Degrade Wetland Water Quality**

  Fill material placed in a wetland during rail construction would result in the permanent loss of the wetland's ability to improve water quality; on a watershed level, any permanent wetland loss could reduce the capacity of regional wetlands to improve water quality. Any alteration of wetland hydrology could also reduce a wetland's ability to improve water quality by changing the natural hydrologic flows. For example, if a wetland with a high ability to retain water were channelized to direct flow through a culvert under the railbed, the amount of time water remained in the wetland could be reduced, thereby affecting the ability of the wetland to retain and filter sediments and other contaminants. Conversely, railbeds could fragment the normal flow through wetlands, leading to the creation of surface water impoundments that would decrease water circulation and lead to water stagnation. Decreased water circulation can result in increased water temperature, lower dissolved oxygen levels, changes in salinity and pH, the prevention of nutrient outflow, and increased sedimentation (U.S. Environmental Protection Agency 1997).

  Ground disturbance in or near wetlands could also result in degraded water quality of the wetland itself. The primary concerns are impacts associated with sedimentation and petroleum products. Soil disturbance and exposure to rain and surface runoff during rail construction could increase sediment in nearby wetlands, potentially increasing surface water turbidity, smothering vegetation, reducing water oxygen levels, and reducing water storage capacity. Petroleum leaks and accidental spills from rail construction equipment are other potential sources of wetland water contamination. While many wetlands act to filter out sediment and contaminants, any significant increase in sediment or contaminant loading could exceed the capacity of a wetland to perform its normal water quality functions.

- **Decrease Wetland Stormwater and Floodwater Storage Capacity**

  Fill material placed in a wetland during rail construction would result in the permanent loss of the wetland's ability to impede and retain stormwater and floodwater; on a watershed level, any permanent wetland loss could reduce the capacity of regional wetlands to impede and retain these flows. Any alteration of wetland hydrology could also reduce a wetland's ability to retain water by changing the natural hydrologic flows. For example, if a wetland with a high ability to retain stormwater and floodwater were channelized to flow directly through a culvert under the railbed, the volume of water that the wetland would have otherwise been able to retain could be reduced.

Clearing and trimming of wetland vegetation would also reduce the capacity of wetlands to impede and retain stormwater and floodwater. Densely vegetated wetlands have a greater ability to slow down and retain stormwater and floodwater; clearing or removing wetland vegetation from rail construction would reduce this functional capacity.

Operation

The following operation impacts on wetlands are common to all build alternatives. The severity of the impacts common to all build alternatives would vary depending on the volume of train traffic and required maintenance.

Most wetland impacts would occur during construction of the proposed line. However, potential impacts on wetlands also could occur during rail operation because of maintenance activities and incidental pollutant discharges from train operation. Train traffic on the proposed line would average 7.4 trains per day, but could be as high as 26.7 trains per day under the high coal production scenario.[3] The number of trains per day would not change the types of operation impacts described below, but could affect the extent of the impact (e.g., more trains could result in increased maintenance activities or increased incidental discharge of pollutants).

- **Alter Wetlands Because of Maintenance Activities**

  Maintenance activities on the proposed rail line would include vegetation maintenance in the right-of-way and repairs and maintenance associated with tracks, access roads, ditches, bridges, culverts, and other associated rail infrastructure. These activities would be infrequent and brief. Vegetation would be periodically cleared or trimmed in the right-of-way to ensure safe rail operation. Clearing or trimming could permanently alter a wetland vegetation community and structure (e.g., a scrub/shrub wetland that is continuously cleared for maintenance could convert an existing wetland to an emergent wetland). Any change in wetland vegetation structure could alter the habitat, water quality, and hydrology functions that the wetland provides. Maintenance associated with tracks, access roads, ditches, bridges, culverts, and other rail infrastructure could disturb the ground surface, require the use of chemicals (such as herbicides), or result in petroleum leaks and spills from maintenance vehicles and equipment. Any mobilized sediment, spilled chemicals, or petroleum products could reach wetlands, which could degrade vegetation communities, habitat, water quality, and overall wetland productivity.

[3] The coal production scenarios (low, medium, high) reflect different levels of rail traffic, depending on which build alternative is licensed, which mines are induced or developed, and the production capacities of those mines. The coal traffic scenarios are described in Appendix C, *Coal Production and Markets.* The related rail traffic is summarized in Chapter 2, Section 2.3.3, *Rail Traffic*.

Fugitive dust from loose soil and gravel access roads could be generated from vehicles and equipment involved in maintenance activities. Any accumulation of fugitive dust on wetland vegetation could affect plant growth by inhibiting photosynthesis, which could result in reduced vegetation density and plant diversity. This could also allow invasive plant species to take hold and colonize wetland areas, which could reduce plant species richness.

- **Deposit Pollutants from Rail Operation**

The proposed railroad operation has the potential to deposit pollutants as water drains from the railroad into watercourses and wetlands (Osborne and Montague 2005). The two most important types of pollutants connected with railway transport are polycyclic aromatic hydrocarbons (PAHs) and heavy metals (Wilkomirski et al. 2010). PAHs occur naturally throughout the environment in the air, water, and soil, but can also be manufactured and are found in substances such as asphalt, oil, coal, and creosote (Agency for Toxic Substances and Disease Registry 1995). The main source of PAHs in areas around rail lines derives from substances used for rolling stock use such as machine grease, fuel oils, and transformer oils (Wilkomirski et al. 2010). Heavy metals in emissions and rolling stock material abrasion can accrue on plants and in soil (Wilkomirski et al. 2010). Stormwater discharges from the railbed and access roads could convey low concentrations of these pollutants to wetlands. Most PAHs do not dissolve easily in water, and they stick to solid particles and settle to the bottom of surface waters (Agency for Toxic Substances and Disease Registry 1995). However, PAH contents of plants and animals may be much higher than PAH contents of the soil or water in which they live (Agency for Toxic Substances and Disease Registry 1995). Various plant species have been shown to accumulate and tolerate PAHs; Simonich and Hites (1994 in Liu et al. 2009) found that half of the PAHs released from the contamination resources can be absorbed and removed by plants. However, other studies have indicated that PAHs can stunt plant growth and affect root physiology (Liu et al. 2009). Similar to plant responses to PAHs, plants may experience negative effects from heavy metals, resulting in growth inhibition and physiological damage, but plants also have their own resistance mechanisms against toxic effects and for detoxifying heavy metal pollution (Cheng 2003). Any potential releases of PAHs and heavy metals associated with operation of the proposed rail line could degrade wetland plants and vegetation communities in the immediate vicinity of the rail line.

Coal dust impacts are assessed in Chapter 6, *Coal Dust*. Coal dust that deposits to the ground could make its way into wetlands where it could affect plants and water. Ecological impacts could occur if plants are exposed to coal dust and its constituents in the soil. However, coal dust constituent concentrations in soils were found to be below screening levels for ecological exposure.

9.5.4.2 Impacts by Build Alternative

The impacts on wetlands that are specific to each build alternative are described below, and are represented in the following tables.

- Table 9.5-2 shows the total acres of wetlands within the right-of-way for each build alternative, by wetland type.
- Table 9.5-3 shows the total acres of wetlands within the right-of-way by functional rating.
- Table 9.5-4 shows the wetlands that would be affected by road relocations by wetland type.
- Table 9.5-5 shows the wetlands that would be affected by road relocations by wetland functional rating.
- Table 9.5-6 shows the acres of wetlands in the area adjacent to the right-of-way, for each build alternative, by functional assessment category.

Table 9.5-2. Wetland Types within the Right-of-Way by Build Alternative (acres)

Build Alternative	PEM	PSS	PAB	P	R	Total Acres
Tongue River	6.9	0.5	3.9	4.7	12.7	28.8
Tongue River East	7.4	0.7	3.7	4.5	16.0	32.3
Colstrip	1.3	0.0	0.5	0.3	6.0	8.1
Colstrip East	4.5	3.4	0.3	0.0	10.2	18.4
Tongue River Road	8.6	0.0	5.8	3.7	13.3	31.4
Tongue River Road East	8.6	0.0	5.6	3.4	15.7	33.3
Moon Creek	3.8	0.5	2.5	3.4	16.0	26.3
Moon Creek East	4.3	0.7	2.3	3.2	19.3	29.8
Decker	0.0	0.0	0.0	0.3	9.2	9.5
Decker East	0.0	0.0	0.0	0.0	8.6	8.6

Notes:
See Appendix M, *Wetland Resources and Assessments*, for field data
Lacustrine (L) wetlands are not shown in the table because none of the build alternatives' rights-of-way would affect these wetlands
Total acres may not equal sum of values due to rounding
P = palustrine, EM = emergent, SS = scrub-shrub, AB = aquatic bed, R = riverine

Table 9.5-3. Functional Rating of Wetlands within the Right-of-Way by Build Alternative (acres)

	Functional Assessment Category			
Build Alternative	**I**	**II**	**III**	**IV**
Tongue River	0.0	2.6	19.4	6.8
Tongue River East	0.0	4.1	19.4	8.9
Colstrip	0.0	2.0	2.1	3.9
Colstrip East	0.0	9.8	2.5	6.1
Tongue River Road	0.0	2.3	19.4	9.6
Tongue River Road East	0.0	2.3	19.4	11.6
Moon Creek	0.0	2.6	14.7	8.9
Moon Creek East	0.0	4.1	14.7	11.0
Decker	0.0	2.1	1.9	5.5
Decker East	0.0	2.1	1.5	5.1

Notes:
See Appendix M, *Wetland Resources and Assessments*, for field data
Sums may not equal totals presented in Table 9.5-2 due to rounding

Table 9.5-4. Wetlands Affected by Road Relocations, by Wetland Type (acres)

Build Alternative	PEM	PSS	PAB	P	R	Total Acres
Tongue River	0.2	0.0	0.0	0.0	0.1	0.3
Tongue River East	0.2	0.0	0.0	0.0	0.1	0.3
Colstrip	0.1	0.0	0.0	0.0	0.1	0.2
Colstrip East	0.1	0.0	0.0	0.0	0.1	0.2
Tongue River Road	0.0	0.0	0.0	0.0	0.1	0.1
Tongue River Road East	0.0	0.0	0.0	0.0	0.1	0.1
Moon Creek	0.2	0.0	0.0	0.0	0.1	0.3
Moon Creek East	0.2	0.0	0.0	0.0	0.1	0.3
Decker	0.0	0.0	0.0	0.0	0.0	0.0
Decker East	0.0	0.0	0.0	0.0	0.1	0.1

Notes:
Lacustrine (L) wetlands are not shown in the table because none of the build alternatives' rights-of-way would affect these wetlands
Wetland impacts would include only those associated with road relocations outside of the right-of-way. Road relocation wetland impacts within the right-of-way are included in Table 9.5-2
Impact acreages of 0.0 may include impacts that are too small (<0.05 acre) to report to one decimal point
P = palustrine, EM = emergent, SS = scrub-shrub, AB = aquatic bed, R = riverine

Table 9.5-5. Wetlands Affected by Road Relocations, by Functional Rating (acres)

Build Alternative	Wetlands by Functional Assessment Category (acres)				Total Acres
	I	II	III	IV	
Tongue River	0.0	0.0	0.2	0.1	0.3
Tongue River East	0.0	0.0	0.2	0.1	0.3
Colstrip	0.0	0.0	0.1	0.1	0.2
Colstrip East	0.0	0.0	0.1	0.2	0.3
Tongue River Road	0.0	0.0	0.0	0.1	0.1
Tongue River Road East	0.0	0.0	0.0	0.1	0.1
Moon Creek	0.0	0.0	0.2	0.1	0.3
Moon Creek East	0.0	0.0	0.2	0.1	0.3
Decker	0.0	0.0	0.0	0.0	0.0
Decker East	0.0	0.0	0.0	0.1	0.1

Notes:
See Appendix M, *Wetland Resources and Assessments*, for field data
Sums may not equal totals presented in Table 9.5-4 due to rounding
Wetland impacts include only those associated with road relocations outside of the right-of-way. Road relocation wetland impacts within the right-of-way are included in Table 9.5-3
Impact acreages of 0.0 may include impacts that are too small (<0.05 acre) to report to one decimal point

Table 9.5-6. Wetlands in the Area Adjacent to the Right-of-Way by Functional Rating (acres) and Build Alternative

Build Alternative	Wetlands by Functional Assessment Category (acres)				Total Acres
	I	II	III	IV	
Tongue River	0.0	69.0	66.0	18.0	153.0
Tongue River East	0.0	16.5	65.4	20.6	102.5
Colstrip	0.0	49.3	14.6	14.7	78.6
Colstrip East	0.0	13.8	14.9	17.7	46.4
Tongue River Road	0.0	66.3	65.1	19.8	151.2
Tongue River Road East	0.0	22.1	64.2	22.3	108.6
Moon Creek	0.0	61.5	46.1	21.3	128.9
Moon Creek East	0.0	9.1	45.5	23.9	78.5
Decker	0.0	6.1	5.5	9.6	21.2
Decker East	0.0	2.6	6.0	9.0	17.6

With the exception of wetlands that would be affected by road relocations, wetlands adjacent to the right-of-way would not be filled, cleared, or excavated during actual rail construction, but could be affected by rail construction activities in the right-of-way. These impacts are described in Section 9.5.4.1, *Impacts Common to All Build Alternatives; Construction*, and could include alterations to wetland hydrology, water quality, and vegetation growth and diversity. Impacts on wetlands adjacent to the right-of-way cannot be quantified (Section 9.5.2, *Analysis Methods*), but build alternatives with more acres of wetlands adjacent to the right-of-way would result in a greater area of wetlands that could be susceptible to construction impacts when compared to build alternatives with fewer acres of wetlands adjacent to the right-of-way.

Tongue River Alternatives

Tongue River Alternative

Construction of the Tongue River Alternative would affect 28.8 acres of wetlands within the right-of-way. Construction would affect mostly riverine wetlands (44 percent), and would have smaller impacts on palustrine emergent (24 percent), palustrine (16 percent), palustrine aquatic bed (14 percent), and palustrine scrub-shrub (2 percent) wetlands. The Tongue River Alternative would not affect lacustrine wetlands (Table 9.5-2). Of the wetland acres affected, 67 percent would be Category III, 24 percent would be Category IV, and 9 percent would be Category II wetlands (Table 9.5-3).

Road relocations for the Tongue River Alternative would affect a total of 0.3 acre of wetlands, including palustrine emergent and riverine wetlands (Table 9.5-4). These wetlands include Category III and Category IV wetlands (Table 9.5-5).

The Tongue River Alternative would have 153 acres of wetlands adjacent to the right-of-way, consisting of Category II (45 percent), Category III (43 percent), and Category IV (12 percent) wetlands (Table 9.5-6).

Tongue River East Alternative

Construction of the Tongue River East Alternative would affect 32.3 acres of wetlands within the right-of-way. Construction would affect mostly riverine wetlands (50 percent), and would have smaller impacts on palustrine emergent (23 percent), palustrine (14 percent), palustrine aquatic bed (11 percent), and palustrine scrub-shrub (2 percent) wetlands. The Tongue River East Alternative would not affect lacustrine wetlands (Table 9.5-2). Of the wetland acres affected, 60 percent would be Category III, 27 percent would be Category IV, and 13 percent would be Category II wetlands (Table 9.5-3).

Road relocations for the Tongue River East Alternative would affect a total of 0.3 acre of wetlands, including palustrine emergent and riverine wetlands (Table 9.5-4). These wetlands include Category III and Category IV wetlands (Table 9.5-5).

The Tongue River East Alternative would have 102.5 acres of wetlands adjacent to the right-of-way, consisting of Category II (16 percent), Category III (64 percent), and Category IV (20 percent) wetlands (Table 9.5-6).

Colstrip Alternatives

Colstrip Alternative

Construction of the Colstrip Alternative would affect 8.1 acres of wetlands within the right-of-way. The Colstrip Alternative would affect mostly riverine wetlands (74 percent), and would have smaller impacts on palustrine emergent (16 percent), palustrine aquatic bed (6 percent), and palustrine (4 percent) wetlands. The Colstrip Alternative would not affect lacustrine scrub-shrub or lacustrine wetlands (Table 9.5-2). Of the wetland acres affected, 25 percent would be Category II, 26 percent would be Category III, and 49 percent would be Category IV wetlands (Table 9.5-3).

Road relocations for the Colstrip Alternative would affect a total of 0.2 acre of wetlands, including palustrine emergent and riverine wetlands (Table 9.5-4). These wetlands include Category III and Category IV wetlands (Table 9.5-5).

The Colstrip Alternative would have 78.6 acres of wetlands adjacent to the right-of-way, consisting of Category II (63 percent), Category III (18 percent), and Category IV (19 percent) wetlands (Table 9.5-6).

Colstrip East Alternative

Construction of the Colstrip East Alternative would affect 18.4 acres of wetlands within the right-of-way. The Colstrip East Alternative would affect mostly riverine wetlands (55 percent), and would have smaller impacts on palustrine emergent (24 percent), palustrine scrub-shrub (19 percent), and palustrine aquatic bed (2 percent) wetlands. The Colstrip East Alternative would not affect palustrine or lacustrine wetlands (Table 9.5-2). Of the wetland acres affected, 53 percent would be Category II, 14 percent would be Category III, and 33 percent would be Category IV wetlands (Table 9.5-3).

Road relocations for the Colstrip East Alternative would affect a total of 0.2 acre of wetlands, including palustrine emergent and riverine wetlands (Table 9.5-4). These wetlands include Category III and Category IV wetlands (Table 9.5-5).

The Colstrip East Alternative would have 46.4 acres of wetlands adjacent to the right-of-way, consisting of Category II (30 percent), Category III (32 percent), and Category IV (38 percent) wetlands (Table 9.5-6).

Tongue River Road Alternatives

Tongue River Road Alternative

Construction of the Tongue River Road Alternative would affect 31.4 acres of wetlands within the right-of-way. Construction would affect mostly riverine wetlands (42 percent), and would have smaller impacts on palustrine emergent (27 percent), palustrine aquatic bed (19 percent), and palustrine (12 percent) wetlands. The Tongue River Road Alternative would not affect palustrine scrub-shrub or lacustrine wetlands (Table 9.5-2). Of the wetland acres affected, 62 percent would be Category III, 31 percent would be Category IV, and 7 percent would be Category II wetlands (Table 9.5-3).

Road relocations for the Tongue River Road Alternative would affect a total of 0.1 acre of riverine wetlands (Table 9.5-4), all Category IV wetlands (Table 9.5-5).

The Tongue River Road Alternative would have 151.2 acres of wetlands adjacent to the right-of-way, consisting of Category II (44 percent), Category III (43 percent), and Category IV (13 percent) wetlands (Table 9.5-6).

Tongue River Road East Alternative

Construction of the Tongue River Road East Alternative would affect 33.3 acres of wetlands within the right-of-way. Construction would affect mostly riverine wetlands (47 percent), and would have smaller impacts on palustrine emergent wetlands (26 percent), palustrine aquatic bed (17 percent), and palustrine (10 percent) wetlands. The Tongue River Road East Alternative would not affect palustrine scrub-shrub or lacustrine wetlands (Table 9.5-2). Of the wetland acres affected, 58 percent would be Category III, 35 percent would be Category IV, and 7 percent would be Category II wetland acres (Table 9.5-3).

Road relocations for the Tongue River Road East Alternative would affect a total of 0.1 acre of riverine wetlands (Table 9.5-4), all Category IV wetlands (Table 9.5-5).

The Tongue River Road East Alternative would have 108.6 acres of wetlands adjacent to the right-of-way, consisting of Category II (20 percent), Category III (59 percent), and Category IV (21 percent) wetlands (Table 9.5-6).

Moon Creek Alternatives

Moon Creek Alternative

Construction of the Moon Creek Alternative would affect 26.3 acres of wetlands within the right-of-way. Construction would affect mostly riverine wetlands (61 percent), and would have smaller impacts on palustrine emergent (14 percent), palustrine scrub-shrub (2 percent), palustrine aquatic bed (10 percent), and palustrine (13 percent) wetlands. The Moon Creek Alternative would not affect lacustrine wetlands (Table 9.5-2). Of the wetland acres affected, 56 percent would be Category III, 34 percent would be Category IV, and 10 percent would be Category II wetlands (Table 9.5-3).

Road relocations for the Moon Creek Alternative would affect a total of 0.3 acre of wetlands, including palustrine emergent and riverine wetlands (Table 9.5-4). These wetlands include Category III and Category IV wetlands (Table 9.5-5).

The Moon Creek Alternative would have 128.9 acres of wetlands adjacent to the right-of-way, consisting of Category II (48 percent), Category III (36 percent), and Category IV (16 percent) wetlands (Table 9.5-6).

Moon Creek East Alternative

Construction of the Moon Creek East Alternative would affect 29.8 acres wetlands within the right-of-way. Construction would affect mostly riverine wetlands (65 percent), and would have smaller impacts on palustrine emergent (14 percent), palustrine scrub-shrub (2 percent), palustrine aquatic bed (8 percent), and palustrine (11 percent) wetlands. The Moon Creek East Alternative would not affect lacustrine wetlands (Table 9.5-2). Of the wetland acres affected, 49 percent would be Category III, 37 percent would be Category IV, and 14 percent would be Category II wetlands (Table 9.5-3).

Road relocations for the Moon Creek East Alternative would affect a total of 0.3 acre of wetlands, including palustrine emergent and riverine wetlands (Table 9.5-4). These wetlands include Category III and Category IV wetlands (Table 9.5-5).

The Moon Creek East Alternative would have 78.5 acres of wetlands adjacent to the right-of-way, consisting of Category II (12 percent), Category III (58 percent), and Category IV (30 percent) wetlands (Table 9.5-6).

Decker Alternatives

Decker Alternative

Construction of the Decker Alternative would affect 9.5 acres within the right-of-way. Construction would affect mostly riverine wetlands (97 percent), and would have a minor impact on palustrine wetlands (3 percent). The Decker Alternative would not affect palustrine emergent, palustrine shrub-scrub, palustrine aquatic bed, or lacustrine wetlands (Table 9.5-2). Of the wetland acres affected, 58 percent would be Category IV, 22 percent would be Category II, and 20 percent would be Category III wetlands (Table 9.5-3).

Road relocations for the Decker Alternative would affect a small area of Category III and IV riverine wetlands (<0.05 acre total) (Table 9.5-4 and 9.5-5).

The Decker Alternative would have 21.2 acres of wetlands adjacent to the right-of-way, consisting of Category II (29 percent), Category III (26 percent), and Category IV (45 percent) wetlands (Table 9.5-6).

Decker East Alternative

Construction of the Decker East Alternative would affect 8.6 acres of wetlands within the right-of-way. Construction would affect only riverine wetlands (100 percent) (Table 9.5-2). Of the wetland acres affected, 59 percent would be Category IV, 24 percent would be Category II, and 17 percent would be Category III wetlands.

Road relocations for the Decker East Alternative would affect a total of 0.1 acre of Category III and IV riverine wetlands (Table 9.5-4 and Table 9.5-5).

The Decker East Alternative would have 17.6 acres of wetlands adjacent to the right-of-way, consisting of Category II (15 percent), Category III (34 percent), and Category IV (51 percent) wetlands (Table 9.5-6).

9.5.4.3 No-Action Alternative

Under the No-Action Alternative, TRRC would not construct and operate the proposed Tongue River Railroad, and there would be no impacts on wetlands from construction or operation of the proposed rail line.

9.5.4.4 Mitigation and Unavoidable Environmental Consequences

To avoid or minimize the environmental impacts on wetlands from the proposed rail line, OEA is recommending that the Board impose ten mitigation measures, including six volunteered by TRRC (Chapter 19, Section 19.2.6, *Water Resources*). These measures would require TRRC to complete a jurisdictional delineation of wetlands and other surface waters, comply with all state and local permits for placement of fill, provide mitigation for unavoidable impacts on wetlands and waters of the United States, implement all reasonable best management practices to minimize impacts on wetlands and waters of the United States, conduct wetland delineations, obtain Section 404 permits, obtain Section 401 certification, comply with the conditions of the Section 404 permit and Section 401 certification, implement compensatory mitigation for impacts on wetlands, and design and construct the rail line to maintain natural flow and connectivity of floodplains and wetlands.

Even with the implementation of OEA's recommended mitigation measures and TRRC's voluntary measures, construction and operation of the proposed rail line would cause unavoidable impacts on wetlands. These impacts could degrade wetland habitat from placement of fill material and degrade wetland water quality and function. OEA considers the filling of these wetlands to be an adverse impact. Additional unavoidable impacts could include the degradation of wetland stormwater and floodwater storage capacity and wetland quality from wetland alterations and discharges of pollutants into wetlands. In conclusion, these impacts would be adverse. OEA concludes that these impacts would be adverse.

9.6 Applicable Regulations

Different federal, state, and local entities are responsible for the regulation of water resources. These entities and the regulations and guidance related to water resources are described in Table 9.6-1.

Table 9.6-1. Regulations and Guidance Related to Water Resources

Regulation, Statute, Guideline	Explanation
Federal	
USACE, USEPA, and FEMA have jurisdiction over water resources based on federal statutes and associated regulations. Executive Orders that apply to all federal agencies also provide for the protection of surface waters. The following federal statutes and Executive Orders apply to water resources that could be affected by the proposed rail line.	
National Environmental Policy Act (42 U.S.C. § 4321 *et seq.*)	Requires the consideration of potential environmental effects, including potential effects of (or on) contaminated sites in the environmental impact statement for any proposed major federal agency action. NEPA implementation procedures are set forth in the President's Council on Environmental Quality's Regulations for Implementing NEPA (40 C.F.R. Part 1500).
Clean Water Act (33 U.S.C)	Establishes the basic structures for regulating the discharge of pollutants into waters of the United States.[a] The three most common sections of the CWA that relate to impacts on waters of the United States for construction projects are Section 404, Section 401, and Section 402. USEPA and USACE jointly administer the CWA.
Clean Water Act, Section 401	Requires a water quality certificate to ensure that a project does not violate state or tribal water quality standards. The CWA directly grants all states Section 401certification authority, and currently all states have retained their authority. In Montana, the Montana DEQ administers the Section 401 Water Quality Certification program. A Section 401 Water Quality Certificate must be issued prior to the issuance of a Section 404 permit or Section 402 permit (see next bullet).
Clean Water Act, Section 402	Establishes the NPDES program to regulate point-source discharges of pollutants into waters of the United States. The NPDES Construction General Permit is required if construction activities would disturb 1 acre or more of land. The primary requirement for this permit is the development of an SWPPP. NPDES permits are issued by either USEPA or authorized states/tribes. In Montana, USEPA has authorized the Montana DEQ to issue NPDES permits under the MPDES program.
Clean Water Act, Section 404	Establishes a program to regulate the discharge of dredged or fill material into waters of the United States. USACE is responsible for administering the permitting program, while USEPA provides program oversight and has permit veto authority.

Regulation, Statute, Guideline	Explanation
National Flood Insurance Act	The National Flood Insurance Act establishes the NFIP, which is a voluntary floodplain management program for participating communities (cities, towns, or counties). The program is administered by FEMA. Under the program, communities are required to adopt sound floodplain management programs, and in exchange, FEMA makes floodplain insurance available to the community to protect against financial losses related to floods. Any development within a FEMA-mapped 100-year floodplain must comply with the community's floodplain management regulations. Permitting and compliance with the regulations are conducted by the participating community (city, town, or county).
Executive Order 11990, Protection of Wetlands	"Minimize[s] the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." To meet these objectives, federal agencies, in planning their actions, are required to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. Does not apply to the issuance by federal agencies of permits, licenses, or allocations to private parties for activities involving wetlands on non-federal property.
Executive Order 11988, Floodplain Management	"Reduce[s] the risk of flood loss, to minimize impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains." To meet these objectives, each agency has the responsibility to evaluate the potential effects of its actions on floodplains. Applies to management of federal lands and facilities; federally undertaken, financed, or assisted construction and improvements; and federal activities and programs affecting land use, including land resource planning, regulating, and licensing activities.
State The Montana DEQ, Montana DNRC, and Montana FWP have jurisdiction over water resources. The following state statutes apply to water resources that could be affected by the proposed rail line.	
Montana Natural Streambed and Land Preservation Act (MCA 75-7-101 *et seq.*)	Protects and preserves natural streams and lands immediately adjacent to them, and in so doing, minimize soil erosion and sedimentation. The associated 310 permit is required for any activity that physically alters or modifies the bed or immediate banks of a perennially flowing stream by any private, non-governmental person, or entity on public or private land. The permit is administered by the Board of Supervisors of the local conservation district (of the Montana Association of Conservation Districts) in which the project takes place.

Regulation, Statute, Guideline	Explanation
Montana Water Quality Act (MCA 75-5, Parts 1 through 10), Montana Section 401 Water Quality Certification (MCA 75-5-401 *et seq.*), MPDES (MCA 75-5-101 *et seq.*)	Establishes the water conservation and protection policy of Montana, including the prevention, abatement, and control of water pollution. The act is the primary basis for water quality protection in Montana and incorporates both national and state policy by integrating the directives of the federal CWA, while also codifying the priorities of the Montana Constitution's environmental quality clauses. The comprehensive program is administered by the Montana DEQ. The following are covered under the act and would be applicable to the proposed rail line. Short-Term Water Quality Standards for Turbidity (MCA 75-5-318) establishes the authority for Montana DEQ to provide short-term water quality turbidity standard for stream-related construction activities to protect water quality and to minimize sedimentation. The associated 318 Authorization permit is required for any person, agency, or entity, both public and private, initiating construction activity that will cause short-term or temporary violations of state surface water quality standards for turbidity.
Railroads: Duty to Construct Drains and Ditches (MCA 69-14-240)	Requires railroads to construct and maintain suitable ditches and drains along each side of the railroad or to construct culverts or openings through the railroad to connect with ditches, drains, or watercourses, to drain and carry off the water along the railroad whenever the draining of water has been obstructed by the construction of the railroad. The drains or ditches are required to remove and drain off water accumulated upon property adjacent to or upon the right-of-way whose natural channel or outlet has been destroyed or impaired by the embankment of the railway.
Railroad Crossings of Streams (MCA 69-14-535)	States that whenever it may be necessary in the construction of a railroad to cross streams, the railroad is allowed to divert the stream from its present location, but must place the stream in such condition as to not impair its former usefulness, and without unnecessary delay.
Declaration of Policy and Purpose (MCA 85-2-101(3))	States that it is the policy of this state and a purpose of this chapter to encourage the wise use of the state's water resources by making them available for appropriation consistent with this chapter and to provide for the wise utilization, development, and conservation of the waters of the state for the maximum benefit of its people with the least possible degradation of the natural aquatic ecosystems.
Temporary Lease of Appropriation Right (MCA 85-2-427)	Establishes the requirements for a temporary lease of water rights from a holder of an existing surface or groundwater right to ensure the protection of existing water rights. Compliance with the statute is through the Montana DNRC's Temporary Lease of Appropriation Right permit Form No. 650, which establishes the terms and conditions of the temporary lease to ensure there are no adverse effects from the temporary lease.
Montana State Floodplain Hazard Management Regulations (MCA 76-5-301)	Implements the procedures and minimum standards for local floodplain development regulations. The state floodplain regulations meet, and in some instances exceed , the federal NFIP regulations for floodplain development.

Regulation, Statute, Guideline	Explanation
Local	
Rosebud, Custer, Big Horn, and Powder River Counties have jurisdiction over water resources. The following local regulations apply to water resources that could be affected by the proposed rail line.	
Rosebud County Floodplain Ordinance (County Resolution #798, adopted May 2008)	Implements the state floodplain hazard management regulations and the FEMA-approved NFIP floodplain management program for development in designated floodplains and floodways in Rosebud County, Montana.
Custer County Floodplain Ordinance (#113566, adopted September 2, 2009)	Implements the state floodplain hazard management regulations and the FEMA-approved NFIP floodplain management program for development in designated floodplains and floodways in Custer County, Montana.
Big Horn County Floodplain Regulations (Resolution No. 2005-14, adopted April 14, 2005)	Implement the state floodplain hazard management regulations and the FEMA-approved NFIP floodplain management program for development in designated floodplains and floodways in Big Horn County, Montana.
Powder River County Floodplain Management Regulations (Ordinance [no number] adopted June 4, 2007)	Implement the state floodplain hazard management regulations and the FEMA-approved NFIP floodplain management program for development in designated floodways and floodplains in Powder River County.

Notes:

[a] A water of the United States is considered a jurisdictional surface water or wetland under the CWA; the regulatory definition is found at 33 C.F.R. Part 328.3(a), and further guidance is found in the EPA/USACE Memorandum "Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States." Any surface water not meeting this definition is considered non-jurisdictional, and therefore has no statutory protection under the CWA. Non-jurisdictional wetlands are protected under Executive Order 11990.

USACE = U.S. Army Corps of Engineers; USEPA = U.S. Environmental Protection Agency; FEMA = Federal Emergency Management Agency; U.S.C. = United States Code; NEPA = National Environmental Policy Act; C.F.R. = Code of Federal Regulations; CWA = Clean Water Act; Montana DEQ = Montana Department of Environmental Quality; NPDES = National Pollutant Discharge Elimination System; SWPPP = Stormwater Pollution Prevention Plan; MPDES = Montana Pollutant Discharge Elimination System; NFIP = National Flood Insurance Program; FEMA = Federal Emergency Management Agency; MCA = Montana Code Annotated; Montana DNRC = Montana Department of Natural Resources and Conservation; Montana FWP = Montana Fish, Wildlife & Parks